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Iron Ores and the Iron Manufacture of the United States.

Continued from page 513.

NEW YORK

The Orange county mining district covers a surface from seven to nine miles wide, in a northwest and southeast direction, and about twelve miles long from the New Jersey State line towards the northeast. The Ramapo river and valley passes in a southerly direction through the centre of it, separating it into two portions. The eastern contains the mines, that lie in the western slopes of the Dunderberg Mountain, and the western those bordering the metamorphic limestone and slate formation.—They are all contained in the granite and gneiss rocks, generally ranging in a NNE. and SSE. direction, which is the course of the great belt of primary rocks, as well as of the ridges in which they lie. Variations, however, to a north and south, or northeast and southwest direction are not unusual. The ore occurs in immense stratified masses, like any other rock of igneous origin, or it lies in beds inclined between the layers of gneiss. What would be critically defined *a vein*, is not found here, unless the strings and leaders of ore from the great deposits into the adjoining rocks may be so considered.—But I am inclined to believe the nice distinction between beds and veins is not here applicable—that as there is no question concerning the origin of these ores—that there is no more doubt as to their being rocks of igneous intrusion than that such is the origin of trap rock—so whether the injected matter happened to flow along between the strata of gneiss where there was the least resistance, or filled new channels forcibly opened across these strata, we have no reason for designating one of these deposits by a name implying a limited quantity of ore, and the other by a different name significant of its connecting with inexhaustible sources of it. Prof. H.D. Rogers, in his account of the same features in their continuation in New Jersey, considers all the deposits as *veins* injected through the gneiss, after this rock had received its present inclined position. The grounds, on which he bases this conclusion, are the great irregularities in the thickness of the same vein, sometimes swelling out into bunches 18 to 20 feet wide, and then suddenly contracting to the smallest dimensions again. This is a peculiarity of *veins*, not of *beds*, properly so called, which are only included strata. Then, too, the proportions of ore and gangue in the veins vary continually, and masses of the wall rock frequently occur included in them. I have observed also of these mines, as well as of those west of Lake Champlain, that the deposit of ore is frequently covered by a horizontal 'cap' of the same rock, which surrounds it; that this cap completely cuts off the vein over considerable surface, and that sometimes the same vein is thus cut off several times at different elevations in the mine, the caps forming horizontal platforms of rock, which are altogether irreconcilable with any theory of these deposits being included strata.* When the term *bed* is used therefore in speaking of any of them, it will not be in its strict limited signification.†

The only ore of these mines is the magnetic oxide of varying proportions, of peroxide and protoxide of iron;—of the former generally somewhat more than 69 parts in 100. It is for the most part of rather compact structure, sometimes granular, but very rarely in such coarse grains as is common with many of the ores of Clinton and Essex counties. Very fine crystals of the ore in different modifications of the octoedron are common, and sometimes they are found in the form of a cube. These crystals, the purest form in which any iron ore occurs, contain 72·18 per cent. of iron; the remaining 27·82 parts being oxygen. If there were such an ore as a pure protoxide, it would contain 77 per cent of iron; but 72 per ct. is the most ever found. If assays in the dry way seem sometimes to give more, it is because the button is *'cast iron.'* which always contains some carbon and generally other foreign matters. The impurities in the mass of the ore reduce its percentage to from 50 to 63 of cast iron, which is its yield in the blast furnace. With these impurities the ores smelt better, than they would if free from them, as such would require large additions of similar matters to bring down their percentage to about 50 of metal in the charges of mineral substances; and even then a furnace never works so freely, as when these foreign matters are already combined with the ore. The weight of the ore when pure is about five times the weight of water, which would give 312 lbs. to the cubic foot. It may be calculated at 300 lbs. or about three and a half tons to the cubic yard.

The gangue of the ore is quartz, with which it is almost universally mixed, and with which in its pure state, as silicic acid or silica, it is not unfrequently chemically united. In either case this intimate mixture of siliceous matter is highly favorable to the easy reduction of the ore in the blast fur-

* I have been told that near Rockaway, in New Jersey, one of these caps was thirty feet thick;—a shaft carried through it struck the vein again in the line of its regular course.

† The subject is obscure, and I do not know that it will be made any more clear by the following extract, translated from the work of A. Burat—*Geologie Appliquee*, p. 131:—"Repositories often termed *bed-veins* (filons-couches) to designate either their apparent conformity with the stratification, or their interpolation between the two classes of rocks, and consequently a real conformity with the shape of the igneous masses whose contour they follow, belong almost all to the class of irregular repositories. They have in fact neither the fixed bearing nor the continuity of true veins, towards which, however, they tend to pass. Like veins they have a determined direction and dip; but the continual irregularities of the roof and floor, which have no real parallelism, the nature of the gangues, in fine, the inner structure, rarely symmetrical, refer them rather to the class of protruded masses." Of these the author gives examples of some that are inexhaustible and of others that are limited in extent, and recommends the subject to the most patient and profound study.

nace. If not present in the ore it must be added in some form as a flux, either in sand, siliceous clay, quartz, or siliceous limestone. These melting separately from the ore, the action of each upon the other to produce a glassy cinder and clean globules of cast iron, cannot be so ready, as when the particles of flux and ore are found combined in the same mass. Silica, then, an essential element in the reduction of these ores, is their common gangue.

Sulphur in the form of iron pyrites or bisulphuret of iron is very generally present, often in such quantity as to destroy the value of the ore. Its effect is to make the iron *red-short* or brittle when hot;—and so powerful is it, that even a mere trace of it in bar iron is sufficient to affect its quality, when in other respects the iron would be of superior character. Karsten found iron would not weld, that contained only 34 parts of sulphur in 100,000 of iron But even this substance so powerful to do harm, is not, I imagine, without its use in these ores. Many of them are exceedingly hard and of close texture, strongly resisting the ordinary means of reduction, which, to be rapid and effectual, requires that the materials should readily separate and mix together.—The iron pyrites is subject to decomposition on long exposure to the air or to the roasting process; and being diffused through the mass of ore, it leaves this more porous and open or crumbly and loose. Ores of this character, too sulphurous to work when taken from the mine, have after an exposure to the weather for years, proved of very superior quality. Roasting is not quite so effectual, but it considerably diminishes the percentage of sulphur, and the ores may then be mixed in some proportion with others of different qualities.

Phosphoric acid is rarely absent from these ores, though its percentage is as rarely given in the published analyses. According to Karsten, there is no iron, which does not contain phosphorus. Mr. Hayes also informs me that such is the result of his researches, and farther that it is in no instance united to the iron, but to the metallic bases of the earths contained in it.* If its effect were as injurious as that of sulphur, no country, so to speak, observes Karsten, could furnish strong iron. Its property is the reverse of that of sulphur, the iron, which contains of it more than six parts in 1000 being subject to break by blows when cold; and with one part in 100 the bar cannot be bent cold at a right angle, and is then called *cold-short*. Three parts in 1000 make the iron harder but do not weaken it.† It has generally been considered that all the phosphoric acid in the ores and fuels was converted in the blast furnaces into phosphurets, and in these states combined with the iron only. But Berthier has met with phosphoric acid in the scoriæ, from which iron containing phosphorus had separated, which experiment he considers conclusive against the received opinion.‡

Ores containing an excess of phosphoric acid may be turned to good account by mixing them with others having too much sulphur. The evil properties of each then neutralize each other, and the result may be a good iron, neither red nor cold-short.

Titanium, in the form of titanic acid combined with iron,§ is as common an ingredient of magnetic ores as phosphoric acid, and its percentage is as rarely given in the common analyses. This is to be regretted, for it is more important to be certain how much of these two last named substances is contained in the ore, than to know its percentage in iron. They both escape detection unless particularly looked for; and they both are rather difficult to estimate correctly. The sum of the parts making about the whole is no evidence of the completeness of an analysis of iron ore; for the titanic acid may go in part with the silica and in part with the oxide of iron; and the phosphoric acid with the latter. Analyses of magnetic iron ores, where particular attention is not directed to these substances, can therefore be considered of little value. Titanium is not known to exert any injurious influence upon the character of the iron made from ores containing it; but when these contain a certain percentage of titanic acid—probably more than eight per cent., they are extremely refractory in the blast furnace; melting easily enough, but chilling in the hearth without separation of the iron from the cinder, and with no flow of liquid cinder. Whether this substance is of any service whatever, I have never been able to ascertain.

A great variety of minerals occur in these veins of iron ore. Next to the quartz the most common perhaps is *hornblende*, which in small quantity may be serviceable as a flux rather than injurious. When in too great proportion it is easily separated, as are the other minerals by stamping and washing;—by which process also the ore is better prepared for the furnace. *Feldspar* and *mica*, the other minerals composing the gneiss, are also common in the ore; and besides these are a variety of the siliceous minerals, which, without being necessary constituents of the gneiss, accompany it and the ores here and in New Jersey and at the mines near Lake Champlain. The most common of these are *sahlite, augite, coccolite*, and sometimes *epidote and serpentine*.

These ores are worked—some open to the day like a quarry; but as most of the beds are only a few feet wide, lying in the hills inclined generally at a steep angle to the horizon, excavations of the width (or thickness) of the ore bed follow down its slope, often extending several hundred feet in length and a hundred or more in depth. Pillars of ore, left for the purpose, and wooden props sustain the roof; but at some of the veins this work has been badly conducted, and the roof has settled down, greatly obstructing all subsequent operations. It is too often the case at our mines in different parts of the country, for the sake of cheap mining for a little while, we sacrifice the permanent value of the property, and perhaps endanger the lives of the workmen. The actual termination of these veins either in length or depth is never found; they are sometimes abandoned in one direction or the other, from the vein becoming poorer in quality or quantity of ore. Still beyond the poor spots they are not at all unlikely to turn out rich again. Where a vein cutting through a hill comes out upon its side, it is well to open it by a level driven in as low as possible; this always affords a free passage for the water, which is often more expensive to raise than the ore itself. As this work requires an outlay, for which there is sometimes no immediate return, it is too often neglected. The expense of mining the ores varies, according to their position and freedom from water, from twenty-five cents to a dollar and a quarter.—To include powder and timbering and raising the water a, dollar and a half may be a fairer allowance; but this ought to pay for working the hardest ores in beds no more than five feet thick.

The ores are made use of in some small bloomery establishments and in blast furnaces. The malleable iron made in the former is red-short or cold-short according to the character of the ores used, or it is a very soft tough iron free from these qualities. The pig iron of the blast furnaces is sometimes foundry iron, sometimes forge iron. The former is often the very best No. 1 iron, so that it is used for castings requiring great strength; much of it has been made into cannon, and some qualities of it are in demand for the manufacture of malleable castngs. The forge iron also stands well in the market for its particular uses.

The *Greenwood Furnace* is in the northern part of the valley on the northern slope of the Dunderberg Mountains. The power for raising the blast being furnished by one of the streams, which flows down its sides. It is a furnace well provided with hot blast apparatus, kilns and all the modern improvements for making iron. Its ores are the magnetic ores from its immediate vicinity and from the western side of the Ramapo. They produce a superior quality of iron, which always commands the highest market price.

Townsend's Furnace.—This furnace was built about 11 years since, on the Ramapo river. The Erie railroad now passes within less than a mile of its site. The stack is 45 feet high with boshes of 12 feet. The height of the hearth is from 4½ to 5 feet. It is of round form 7 feet diameter at top and 2½ feet at the tweres. The tunnel head is four feet diameter. The blowing apparatus consists of two cylinders 6 feet long and five feet diameter, which are driven by a water wheel of 26 feet diameter, at the rate of 5 to 6 revolutions of the wheel per minute. The blast is carried into the furnace through the tweres at a pressure of 1¾ lbs. to the square inch.—Charcoal costs about 6½ cts. a bushel. The magnetic ores from the mines of Mr. Townsend are hauled about 5 miles. They cost for mining only about twenty-five cents; the mine is described to me by Mr. Townsend as covering an extent of 50 acres, over 20 of which, the soil being removed, the surface is seen wholly composed of ledges of the ore. For hauling this ore to the Erie railroad the expense is 75 cts. per ton. Since this furnace was built it has never been out of blast more than six weeks at a time, nor made a blast of less than two years duration, nor more than two years and ten months. Its production is from five to eight tons a day; and the iron is highly esteemed for its superior qualities.

The Erie railroad being now completed to the vicinity of the bituminous coal mines of Pennsylvania, their products may be profitably brought to be used with these ores, when charcoal has become a more expensive item than it is at present. Anthracite too from the northern coal fields of Pennsylvania may be brought over the same road, taken from its intersection with the Delaware and Hudson Canal.

The other furnace in Orange county built by the son of Peter Townsend, Esq., is on the outlet of Long Pond near the line of New Jersey, and but

* A paper read before the British Association for the Advancement of Science, in September, 1837, by Dr. Thompson, gives analyses of six varieties of cold blast iron and of the same number of hot blast iron, in which phosphorus does not appear as an element, though besides iron the other substances estimated are copper, manganese, sulphur, carbon, silicon, aluminium, calcium and magnesium. The absence of phosphorus was a subject of remark and surprise by members of the association. The paper may be found in the xxxiv vol. of the American Journal of Science. In 14 analyses of charcoal-iron and 7 of coke-iron by Berthier, phosphorus appears in only three of the former and one of the latter.

† Manuel de la Metallurgie du Fer., vol. 1 p. 155.

‡ Traite des essais par la Voie Seche, vol. II., p. 336.

§ According to Berzelius: but Rose considers that it occurs as a sesqui-oxide of titanium, corresponding to, and isomorphous with, peroxide of iron.

2¼ miles from the Sterling ore bed at the head of the pond, from which it is to be supplied. This furnace, 45 feet high and 14 feet boshes, is intended to run either with anthracite or charcoal. It was built in 1848.

There are several forges on the Ramapo for making bar iron directly from the ore. The following account of the operations at the forge lately belonging to Mr. Dorr of Boston may give some general information concerning this business. Five open fires (bloomery) may make 350 tons of bar iron a year. The ore from the Sterling ore bed, 8 miles distant, costs at the mine $1 per ton, and $1 additional for hauling. Two tons make a ton of iron. Charcoal costs only about 5 cents per bushel, and from 175 to 275 bushels are consumed to the ton of iron according to the finish of the bar. The iron much of it is very soft and tough, and has been used in the manufacture of iron in Massachusetts.

H.

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A mine of magnetic iron ore near Southeast, Putnam county, and the *Kronkite Mine* in Orange county, a notice of which was omitted in the last number of the Journal, will be described in the next number.

H.

Copper Ores of Lake Superior.

Continued from page 513.

The country around Portage Lake, and thence extending to the Ontanagon river, I have examined only about the heads of Trap Rock, Salmon Trout, and Misery rivers. All the small streams flowing into the lake within the above limits take their rise on the northern slopes of the trap ridge not more than ten or twelve miles from the lake. The ascent to the summit is very gradual, and rocky precipices like those which characterise other portions of the ridge are rarely found. For this reason good exposures are wanting for the discovery of veins; and though their existence is rendered certain by finding abundance of fragments of veinstones, including particles of copper in the streams, and even lumps of copper also, the great depth of soil and superficial matters will long continue to conceal the metallic treasures beneath. This district is remarkable for its fine growth of timber, both of hard wood and pine; indeed, almost every where on the trap range, at a distance from the less fertile lands of the lake, are found white pines of the largest size scattered among the beautiful groves of sugar maple and birch. The maple flourishes with unwonted luxurience on the rich soil, which overlies the trap rock; and its wood attains a solidity and beauty not known in the same tree of warmer latitudes.

No mines of importance have been opened in the region except about the heads of Fire Steel and Flint Steel rivers. This seems to be, from the accounts I have gathered, a region of unusual promise. It is already occupied by several companies, which, however, for want of capital, or for being interested in other localities, have hitherto done little to develop it.

The two most prominent mines are the *Algonquin and Douglass Houghton*. The few data I have of these were given me by J. R. Grout, Esq., a gentleman well known for his extensive acquaintance with the mines of this region; and in whose judgment and opinion on all points connected with them much confidence is justly placed.

The *Douglass Houghton* mine is situated about 16 miles from the lake, on the head waters of Fire Steel river. The company have purchased 200 acres, and the whole amount of their expenditures on this and other locations has been about $20,000; only $1800 of which was for the mining operations on this tract. The vein is a quartz and calcareous spar vein, two or three feet wide. It pursues a parallel course with the ridge instead of across it, as do the veins on Keewena Point, and dips about 65° towards the NW. It is included between bands of amygdaloid, whose position conforms to that of the stratified rocks, which repose upon the trap. The line of division between the veinstone and the wall rocks is well defined. On the face of the cliff the vein has been opened in three places: 60 feet below its top a level has been driven in 26 feet, from which 9 tons of ore have been obtained, estimated to contain from 40 to 50 per cent. of copper. The character of this ore is so rich, that in connection with the permanent nature of the vein, great confidence is entertained that the mine will prove to be a very valuable one.

The *Algonquin* mine is two miles and a half northeast of the Douglass Houghton, and 16 miles from the lake. A vein is here exposed on the surface, from which 125 tons of ore have been raised, which is estimated to average about 15 per cent. of copper. Like the vein just described, it runs longitudinally with the ridges, and is included in the bands of amygdaloid, having the same underlay with these. Such is the character of all the veins of this region. Their relation to the including rocks classes them in the same category with the great iron ore veins of northern New York and New Jersey as well as the zinc mines of the latter state, all of which are included between the strata of gneiss rocks of these districts. In the geological reports of the New York Survey it is left an open question whether these are to be regarded as true veins or imbedded strata of uncertain reliance; and in New Jersey a high foreign authority has inspired with some a doubt as to the continuance of the zinc ores for the same reason. Prof. H. D. Rogers in the New Jersey State Geological Report, however, inclines to regard them in the light of permanent veins; and such facts, as their always having the structure, composition and contents of true veins, with ores scattered in particles and in threads thro' the wall rocks, leave little room to question their identity with true veins of injection, and consequently their reliability for permanence. This must particularly be the case with veins, whose metalliferous portions are solid metallic masses, and whose repositories are rocks of undisputed igneous origin. I have given farther attention to this subject in my articles on the iron mines of New York and New Jersey, now in course of publication in the Railroad Journal. The present number has particular reference to this subject.

The position of the copper mines now under consideration is unfavorable as regards transportation, being so far in the interior. But as several promising localities are found in the same vicinity, it is not improbable, that when the mines are farther developed, a plank road will be constructed to the lake, for which the even face of the country and abundance of excellent timber afford the most convenient facilities.

H.

Remarks on Patent Inventions.

These regard the relative bulk of the vapor produced from corresponding quantities of different fluids, and the proportion of heat absorbed or rendered latent in each during the process of vaporisation. The calculation is sufficiently simple; and the result effectually annihilates all hope of advantage, either potential or economical, from the etherial or alcoholic engines. Thus, to convert a given weight of water into steam, 997° of heat are required as what is called "caloric of vaporization." The same quantity of alcohol will become vapor with 442°, and sulphuric either with only 302°. But to set against this apparent gain, we find that the specific gravity of steam (air being = 1) is ·6235; vapor of alcohol 1·603; either 2·586; and the result may be thus tabulated.

	Caloric of Vaporization.	Spec. Grav. of vapor.	Useful effects of caloric.
Water	997°	·6235	100,000
Alcohol	442°	1 603	8,776
Sulph. Ether	302°	2 586	7,960

The disadvantage of the latter fluids will be farther enhanced by the circumstance that, being lighter than water, a larger boiler will be required to hold the same weight of vaporific fluid:—*i. e.*, a pound of water, when evaporated, will form about 21 feet of steam; while a pound of ether will require a large boiler to hold it, and will only form 5 cubic feet.

Weight is one of the properties of matter which in practice we encounter chiefly as an obstacle of inconvenience, tending to increase friction, to resist motion, and generally to crush and destroy. Meanwhile, the limits of its range are comparatively narrow—that is to say on one side. We can, indeed, rarefy a gas until its weight disappears in infinite tenuity; but we very soon find ourselves at the extreme verge of any possible increase of specific gravity. The most ponderous substance known is not quite twenty-two times heavier than water.—And yet there are many purposes for which bodies of greater weight might be made useful. If, for example, closer or deeper search amid the stores of the mineral kingdom should lead to the discovery of some substance bearing the same proportionate gravity to platinum, that platinum does to cork, how many possibilities of improvement would be placed within our power! A thin sheet of such a substance interposed among the keel timbers of a ship, would give stability and other sailing qualities at present unattainable. Blocks of it would afford sure foundations for piers, bridges, and all marine works.—it might then be found no longer impossible to establish a lighthouse on the Goodwins. As a regulator or reservoir of power—for counterpoises, pendulums, and fly-wheels; for all purposes where percussive force is required; and in steam-hammers, pile-drivers, and shot of long range, the utility of such a substance would be enormous. In each and all of these subjects, we are limited by the limits of specific gravity in our materials.

The "Strength of Materials" is an element that enters into almost every calculation of the mechanist; and it is found to constitute not only an absolute limit to all possibility of advance in certain directions, but also a relative limit universally, when we attempt to reduce beyond certain proportions, the size, weight, and cost of our mechanical erections its variations also are extensive both in degree and in condition. Some bodies offer strong resistance only to certain modes of attack. Impervious on one surface, they will yield and splinter into laminæ under a slight blow upon another. Some will bear pressure to an enormous extent, but are easily torn assunder; others resist the divelent forces, but crumble under a light weight. A very extensive variety of substances possess a fibrous texture, and are endowed with vast strength to resist a strain in the direction of their length, but are much weaker against a lateral or transverse force. This difference is found to vary to an infinite extent; from that of certain metals where the advantage is only four or five per cent. in favor of the direct resistance, to the vegetable and animal fibres, such as flax or silk, which possesses enormous tenacity, combined with most complete flexibilty.

The variations in the natural properties of bodies have given infinite scope for the exercise of human ingenuity. In the erection of engineering works, and in a still higher degree in the contrivance and construction of moving machinery, the combination of theory and practice is perpetually exhibited in surprising perfection. By nice calculation of the opposing forces, together with great practical skill in the mechanical details of construction, we can now attain a result in which abundant strength is united with the utmost possible economy of space and material. There is no waste; no addition of useless and cumbrous weight: all irregular strains are skilfully counterbalanced, and the greatest pressure distributed over the points of greatest resistance.

Experience has entitled us to place implicit confidence in the scientific precision of our engineers.—Every day we trust our lives and fortunes, without misgiving, into situations where a slight error in the calculations, or a slight defect in the workmanship, would inevitably lead to some terrible catastrophe. How little do the crowds who throng the deck of a Thams or Clyde steamboat, or who allow themselves to be hurried along at fifty miles an hour in a railway carriage, reflect upon the delicate conditions which must have been fulfilled—the complicated mechanical problems which must have been solved, in order that they might accomplish their journey in security. A multitude will gather upon a suspension bridge without fear or danger, although the rods by which the massive roadway and its living freight are sustained appear as mere threads in comparison with the mass they have to support: while, if any one reflects at all upon the matter, it is to assure himself that every possible amount of pressure has been theoretically provided for; and that, practically, every separate bar and joint has been severely tested, so that no single flaw in the material, or defect in the workmanship can have passed without a detection. Fribourg, before the civil war of the Sonderbund had given it a political notoriety, was celebrated chiefly for its wire bridge, hung at an altitude of nearly 100 feet between two summits. "It looks," says a recent traveller, "like a spider's web flung across a chasm, its delicate tracery showing clear and distinct against the sky." Diligence and heavy wagons loomed dangerously as they passed along the gossamer fabric.

The force that enables a suspension bridge to sustain itself is, what we have called the *cohesive* force, and is due, we must suppose, to some variety of the attractive principle among the corpuscular atoms, which causes them to resist a separating or divelent strain. In ordinary bridges and among the usual erections of architects, on the other hand, the pressure to be considered is that which crushes the parts together. To resist this, the piers of the bridge must have strength sufficient to support the loaded arch; and the pillars of the cathedral to sustain the fretted vault that rests upon them. In this case we find that the strength that arises from the cohesion of the atoms between themselves is increased by that due to another quality of matter—namely, its incompressibility. When any solid body yields to a crushing weight, the consequent effect must be, either that its particles are actually pressed into a smaller space; or that, being made to exert a wedge-like action upon one another, the exterior layers are forced out laterally. The addition to a band or hoof will then bring the incompressibility of the atoms more fully into play: and bodies that are endowed with slight powers of cohesion may thus be rendered enormously strong. Indeed we find that fluids, in which the cohesive force is practically at zero, cannot be crushed by any pressure we can exert, provided the hoop or tube that surrounds them be secured. Now the interior atoms of every substance under pressure are more or less thus hooped in and strengthened by the exterior. To the strength from cohesion is added that from incompressibility; and this effect is produced in a rapidly increasing ratio as the sectional area of the body is enlarged. A cube of lead suspended from its upper surface and held together only by cohesion, will break down if larger than 180 feet to a side. If standing upon one side as a base, it might be made of infinite size without danger of fracture from its own weight.

We may conclude, therefore, that the total force of resistance is amply sufficient to answer any call we are likely to make upon it. It is certain, at all events, that we have not, as yet, built up to the strength of our actual materials. Our marble and granite columns will sustain ten times the weight of any edifice the present generation can wish to erect. Or if not, they will use iron. The theoretical limit to the span of our bridges is that only at which the vossours of stone or iron would crumble under the intensity of pressure. The cost and inutility of even approaching to such a limit, will always assign them much narrower dimensions: though large enough, nevertheless, to admit of the accomplishment of that magnificent project—of which the first design is due to the genius of Telford—for spanning the Thames at Westminster by a single arch. Such a work would be worthy alike of the age and the site; and we see no reason why it should not be undertaken, and completed at least as soon as (supposing promises to be kept in future only as heretofore,) the last stone is laid upon the Victoria Tower. The tubular bridges now in course of erection by Mr. Stephenson, upon the Chester and Holyhead line of railway, will probably remain for many years unsurpassed, as specimens of science and engineering skill.

The hypothesis that the force of cohesion is proportional to the area of section, leads us to the ordinary rule of practice—that as the magnitude is increased, the strength increases as the square, and the strain as the cube of the dimensions. The proportions consequently which offer abundant strength in a model, must be materially altered when the design is executed at full size. When any of the parts are intended for motion a new element is introduced, from the inertia of the moving masses; and thus both the size and the velocity of our machinery are confined within definite limits. To extend these limits, it is often necessary to solve the most complicated problems, ofdynamics, and to follow the train of motion through an intricate series of action and reaction. We must simplify and reduce the number of moving parts, and so adjust the *momentum* of the inertia, that the resulting strain shall be neutralised, or reduced to a minimum: and where it is necessary that the direction of motion should be reversed, we must accomplish this object with no such sudden or violent shock as would dislocate the machinery. The difficulty of this attempt in many instances is proved by the heavy motions and hideous noises that accompany the working of almost all newly-invented mechanism, and of the simplest machines found among nations less skilled than we are in the arts of construction.

It is equally unscientific, and almost equally dangerous, to give too much strength to our constructions as too little. No machine can be stronger than its weakest part; and therefore to encumber it with the weight of a superfluous mass, is not only to occasion a costly waste of material, but seriously to diminish the strength of the whole fabric, by the unnecessary strain thus produced upon the parts least able to bear it. This fault is one which is most frequently discoverable in new machinery; and which when once adopted in practice, retains its hold with the greatest inveteracy. It requires no common powers of calculation, and not a little faith, for men to trust to the safety of structures which have apparently been deprived of half their former strength.

There can be no better proof of the difficulties which oppose the adoption in practice of any new principle of construction or configuration, than that exhibited in the history of ship-building. In no creation of human labor was it more necessary to secure the greatest possible strength from the minimum of material; as none were required to possess such vast bulk in proportion to their mass of resistance, or were exposed to more violent varieties of strain and shock, in the natural course of their service.

The men who superintend the public dockyards were often well versed in mathematical science: and were certainly acquainted theoretically with the common axiom, that among right-lined figures, the triangle alone will preserve its form inavailable by the rigidity of the sides, without depending upon the stiffness of the joints. Yet none until a recent period, worked out the axiom into its very obvious practical development. For centuries were our ships constructed on principles which caused the whole frame work to be divided into a succession of parallelograms. Every series of the timbers, as they were built upon from the keel to the decks, formed right-angles with their predecessors and with their successors; so that the whole fabric would have been as pliable as a parallel ruler, but for the adventitious firmness given by the mortices, bolts, and kneepieces. At least three quarters of the available strength of the materials was possibly altogether thrown away. The safety of the whole was made to depend upon its weakest parts; and when decay commenced through process of time or the action of the elements, every successive stage in its advance made the progress more rapid, since the wear and friction increased in double proportion as the fastenings became weak and loose.

Among the properties of matter are some that we may term subsidiary or incidental: qualities which we may be said to discover rather than to comprehend; and whose agencies are of a secret, and as it were stealthy character, so that we cannot always predict their recurrence or calculate their force.

The fluid and gaseous bodies present many instances of these perplexing phenomena. While investigating the conditions under which solid substances enter into solution; the rise of liquids through capillary cavities; the motions of camphor and other bodies when placed on the still surface of water; the phenomena of crystallisation: the condensation of gases in charcoal; or the inflammation of hydrogen when in contact with minutely divided platinum—in these and similar cases, we encounter on every side a series of anomalies which as yet baffle all our efforts to group the incoherent facts into a consistent theory. For the present, therefore, we content ourselves with the functions of empirics and registrars. We must observe and collect the facts which may hereafter furnish a clue to the labyrinth; confident that when that clue is once seized, every step will not only bring us to some result of practical utility, but will reveal yet another example of the divine symmetry of nature.

The limits that are set to improvement by difficulties of construction, or the arrangement of mechanism, require a very different species of analysis from that which has for its object the properties of natural substances: and the terminal problems are susceptible, in general of merely relative solutions. Seldom may we be able to say absolutely—'So far can we go, but no farther." But we are often able to decide among the great objects for which machines are intended—economy, rapidity, and safety,—how far the necessities of each can be accommodated, so as to produce the result of most advantage. Yet even here your verdict can seldom be considered as final. The introduction of a new material, or the suggestion of a new combination of parts, may at once render easy the improvements that have baffled the ingenuity of man for generations. The history of invention is full of such examples. It would be a curious inquiry to trace how many contrivances have been delayed for years from the mere want of knowledge or skill to execute the works; and obliged as it were to lie fallow until the cunning of the workman could sufficiently correspond with the ingenuity of the inventor. When Hadley first constructed the quadrant, still known by his name, for a long period it was perfectly useless in the determination of the longitude, as the indications could not be depended upon to a greater accuracy than 50 leagues. But after Ramsden had invented his "dividing-engine," the graduation was so vastly improved, that even in the commonest instruments an error of five leagues was seldom to be feared. The minute measurements of angular distances by the micrometer were long subject to similar difficulties. The instrument waited, as it were, for Wollaston's discovery of the means to procure platinum wire so fine that 30,000 might be stretched side by side within the breadth of an inch. The limit which was reached by this discovery was followed by another pause. Then came a new advance, owing to the beautiful invention of an eyeglass composed of double refracting spar, so mounted as to revolve in a plane parallel to the axis of refraction, and give, by the gradual separation of the two rays, a measurement suceptible of almost infinite delicacy.

So in the history of the steam-engine. Boulton and Watt had been long partners, and the theory of his great machine was almost perfect, when Mr. Watt still found that his pistons fitted the cylinders so ill as to occasion considerable loss from leakage. In 1774, Mr. Wilkinson, a large iron-master, introduced a new process of casting and turning cylinders of iron. Watt at once availed himself of them, and in a few months the inaccuracy of the piston "did not any where exceed the thickness of a shilling." The wonderful perfection since attained may be seen in a rotary steam-engine patented within the last few months. The steam-chamber presents a sectional plan, somewhat resembling five pointed Gothic arches set round a circle; the outline being formed by ten segments of circles, all referring to different centres. The piston has to traverse round this singularly formed chamber, preserving a steam tight contact at both edges; and such is the accuracy of the workmanship, that the leakage is barely perceptible.

Steam, as applied to locomotion by sea or land, is

the great wonder-worker of the age. For many years we have been startled by such a succession of apparent miracles; we have so often seen results which surpassed and falsified all the deductions of sober calculation,—and so brief an interval has elapsed between the day when certain performance were classed by men of science among impossibilities, and that wherein those same performances had almost ceased to be remarkable, from their frequency—that we might be almost excused if we regarded the cloud-compelling demon with somewhat of the reverence which the savage pays to his superior, when he worships as omnipotent every power whose limits he can not himself perceive. It is not surprising that inventions, designed to improve the forms and applications of steam-power, should constitute a large percentage of the specifications which are enrolled at the Patent Office. Even in France, we learn that within a period of four years, the following number of patents, connected only with railway construction, had been obtained:—In 1843, 19; 1844, 22; 1845, 88; 1846, 131; total 260. Of these we are told that not above three or four have been carried out so as to realise advantage to the inventors, and all of these were of English origin.

The number of English patents is, of course, considerably greater; but we doubt whether the proportion of successful ones has been at all higher. Ingenious men have never expended their energies upon a subject where the splendor of past or possible success has so effectually dazzled their imagination, and rendered them unable to perceive the great difference between the relative and the absolute limits of possibility. Because science had failed to predetermine the point at which higher performances became impossible, they too often began to consider it superfluous to invoke her aid at all—forgetting that the problems are quite different ones—to decide between the relative merits of two modifications of mechanism, and to define the ultimate capabilities of either. There is no more striking example of this tendency than is exhibited in the controversy between the two great systems of railway traction—the locomotive and the atmospheric. This controversy has already cost the public incredible sums; and has, moreover, been so dexterously managed, that even now, if the money markets were to return to a very possible state of plethora, a plausible prospectus and a new patentee would find it no difficult task to organise another company, and to get subscribed fresh hundreds of thousands towards carrying out an experiment which ought never to have required more than a few months' trial and a short length of working line for its final settlement,—for the principles according to which the experiment must succeed or fail, had been determined long since; and it is a fact equally sad and strange, that among the very numerous patents relating to the atmospheric railway, there is not one that touches upon the real turning point of the question. What was called the "longitudinal valve" or opening, through which was established the connection between the piston travelling within the exhausted tube and the train of carriages, formed the *piece de resistance* for the inventors; and very many and clever are the contrivances we find specified for improving or dispensing with this valve. And yet the valve itself entered but as a subordinate function into the equation by which success or failure was to be determined.—Granting that its construction was theoretically perfect, and all friction and leakage annihilated, the main principle, which depend upon the laws that govern the motions of elastic fluid, was left wholly untouched. The history of science, nevertheless, contained records which should have prevented this mistake. One hundred and sixty years ago, M. Papin, one of the earliest inventors of steam machinery, invented a motive apparatus involving this identical principle, and which, when tried, was found wanting. The machine alluded to was described by the inventor as "an engine for pumping the water out of mines by the power of a moderately distant river." His plan was to erect upon the stream or waterfall a series of force-pumps by which air was to be condensed into a reservoir. From this reservoir a close tube, some miles in length, was to be carried over hill and valley from the brink of the river. It was supposed that the condensed air would travel along this tube, and could be applied at the mine, through appropriate mechanism, to keep the pumps going. M. Papin is said to have tried his invention upon a large scale at Westphalia; and it is certain that a similar engine was erected in connection with one of our own Welsh mines; and in both cases with equally ill success. The machines at the useful end could never be got into motion. The condensers on their side worked powerfully, but the blast of air at the distant extremity would hardly blow out a candle; and although it had been calculated that the condensation would be transmitted along the tube in less than a minute, it was found upon trial that the slight impulse which arrived at last had been three hours on the road. As a last attempt, the motion of the air-pumps was reversed, and the effect tried of employing an exhausted tube But this mode proved as inefficacious as the other; and the experiments were finally abandoned.

In the process of weaving by the power-loom we find an analogous example of velocity limited by the broken or altering motion of the acting forces. The rapidity with which the shuttle can be thrown from side to side between the threads of the warp, is limited by the strength of the woof-thread it carries across. When the strain is so great as to cause more than a certain average number of breakings, the net product of the machine will be increased by working at a lower velocity. By a recent improvement, the shuttle is made at every vibration or 'shot' to commence its motion slowly and increase in velocity as it proceeds; thus diminishing the strain upon the thread and economising time, even in the four or six feet that constitute the average extent of each 'shot.' And by this means the looms are sometimes worked at a rate of 180 threads per minute, or 3 in every second. This will constitute the absolute limit of speed under the existing form of construction. To extend it we must introduce a new principle, and discover some method of weaving the tissue in a cylindrical web; when the oscillation of the shuttle might be transformed into a continuous revolution, and the strain upon the woof, arising from the perpetual stoppage and change of motion, be annihilated.

Royal Society.

May 24, 1849.—"On the Direct Production of Heat by Magnetism," by W. R. Grove, Esq. The author recites the experiments of Marrian, Beatson, Wertheim, and De La Rive, on the phenomenon made known some years ago, that soft iron when magnetized emitted a sound or musical note. He also mentions an experiment of his own, where a tube was filled with the liquid in which magnetic oxide had been prepared, and surrounded by a coil; this showes to a spectator looking through it an increase of the transmitted light when the coil was electrized. All these experiments, the author considers, go to prove that whenever magnetization takes place, a change is produced in the molecular condition of the substances magnetized. and it occured to him that if this be the case, a species of molecular friction, heat might be produced. In proving the correctness of these conjectures difficulties presented themselves, the principal of which was that with electro-magnets the heat produced by the electrized coil surrounding them might be expected to mask any heat developed by the magnetism.—This interference the author considers he eliminated by surrounding the poles of an electro-magnet with cisterns of water, and by this means, and by covering the keeper with flannel and other expedients, he was enabled to produce in a cylindrical soft-iron keeper, when rapidly magnetized and demagnetized, a rise of temperature several degrees beyond that which obtained in the electro-magnet, and which therefore could not have been due to conditon or radiation of heat from such magnet. By filling the cisterns with water colder than the electro-magnet. the latter could be cooled while the keeper was being heated by the magnetization. The author subsequently obtained distinct thermic effects in a bar of soft iron placed opposite to a rotating permanent steel magnet. To eliminate the effects of magneto-electrical currents, the author then made experiments with non-magnetic metals and with silico-borate of lead, substituted for the iron keepers, but no thermic effects were developed. He then tried the magnetic metals nickel and cobalt, and obtained thermic effects with both, and in proportion to their magnetic intensity. Some questions of theory relating to the rationale of the action of what are termed "the imponderables" and to terrestrial magnetism then were discussed; and the author concluded by stating that he considers his experiments prove, that whenever a bar of iron or other magnetic metal is magnaized, its temperature is raised.—*Mechanic's Journal.*

Hints on Canalling.

Modern practise adopts a segment of a circle for the cross section of a canal, but a very considerable experience in works of this class has led us in our more recent practice to reject this section. Both theory and observation define a different form. An observer will recollect that a river bank is worn by the water into a succession of little steps or shelves, and that these shelves show a general contour approaching very closely to the convex side of a curve. These convex curves at the sides will be found on examination to run at the bottom of the stream into a concave curve, the depth of a stream decreasing until the bottom meets the sides, the middle being as every one knows the deepest part of the section. These observations are in exact keeping with the theory of the case. In flowing streams the velocity of the water, as shown in the article on the Mississippi Foods in the number of the Journal for 16th June, is least at the bottom, and increasing gradually at every point above that is greatest at the top. In canals this is especially so: for here the causes of motion that exert any material influence are the force of winds and the impact of boats, the former being applied solely at the surface, the latter, owing to the section of boats is least at the keel point a little above the bottom while in consequence of the breadth of beam at that level it is a maximum at the surface of the water. The velocity then is very nearly nothing at the bottom, and increasing gradually above that point is greatest at the top; and consequently the velocity of the water being the measure of the wear and tear, the wear and tear on the banks of a canal increase in intensity for every foot above the bottom. This consideration suggests an embankment whose contour shall be a line of constantly increasing resistance, and surely therefore the concave contour running from a horizontal line at the bottom into an almost vertical line at the top is the very reverse of the theoretical contour—the degree with which earth receeds from its *angle of friction* being evidently the measure of its strength to resist erosion. Therefore the *concave curve is the worst possible section for the stability of the earth slopes of canals.* The slope of continually increasing resistance may however be held to imply either a right line or a convex curve, according to the law by which the resistance increases. If the rate of increase be constant, the increase going on in an arithmetical progression, such a rate defines the slope as rectilineal, but if the increase go on by any other law the slope must assume the form of a convex curve; and therefore the latter as including within it the stability of the straight line would be found, all other things being equal, the safest to be adopted in practise. Indeed did not the case as being to a certain extent a question of wave motion involve too much of abstract reasoning for a popular discussion, the line of resistance defined by the conditions of a canal might be shown to be the convex side of a certain curve, probably part of a parabola. This theory therefore agrees exactly with observation: it shows that while a concave segment is the worst possible profile for the earthwork of a canal, the best profile for the sides are as deduced also from observation, first a convex curve, and secondly as the next nearest approach to this, the right line. The difficulty and delay of putting in the convex section may be considered to unfit it for practise, and therefore as combining a great part of the advantages of that section without much of its inconvenience, we have in several miles of cutting adopted the rectilineal slope rounded off at the level of the water. The following cut will explain this question more fully: the dotted line represents the usual or concave cross section, the light unbroken line the cross section of theory and observation, as described above, and the heavy unbroken line the nearest approach to this that the writer found convenient in practise.

Cross Section for Canals.

In carrying out this section it will be found judicious to put in rough model slopes from a template at certain intervals along the cut, and if great accuracy is required a line stretched from corresponding points on two model slopes may be made to approximate to the accuracy of the sliding guage. We have found in the course of our experience, that a little care and expense in the regularity and finish of the slopes have always had a good effect on the item for subsequent maintenance; indeed it must be very plain that a rough irregular slope by its abrupt resistance to the motion of the water will be constantly caving in while a smooth regular slope being exposed to merely the sliding wash of the water, may be kept in repair at a comparatively trifling cost. The slope may be put in perfectly true by means of a plumb attached to the template, the angle of the plumb with the profile of the template being the intended inclination of the slope.

The course of a canal is the next particular in which we have been lead to deviate from, or rather to modify the usual practise. A line of canal should consist as nearly as possible of straight lines, subject of course to the proper economy of construction When however a deviation from the straight line is made absolutely necessary by local circumstances the straight line should be blended as in railroads by regular curves of as large radii as consistent with the circumstances of the case. Even in laying down the course of a canal in a contour line around a hill, the writer of this has found it always judicious, to break it into a series of straight lines, uniting them by circular segments. The care necessary in laying down these curves is not of course as great as in laying down curves for railways; and as they are generally of frequent recurrence it may be usetul to some of the readers of the Journal to describe a method of laying them down easily and quickly.—Calculate by scale from the *working plan* of the line, the length from the point where the two rectilineal directions produced will cut, to the point where one of these directions becomes a tangent to the curve uniting them; and by the same means calculate also the radius and chord of the curve. Describe then a curve answering to these dimensions on as large scale as possible; and having divided the chord into lengths 30, 40, or 50 feet, calculate by the scale the lengths of the several perpendiculars from the the chord. Lay down on the ground from this data a peg at each end of the chord of the required curve, and having divided the chord into the lengths determined on previously, mark off the several perpendiculars calculated from the enlarged plans by other pegs: having in this way fixed the several loci or points of the curve, a chord stretched around the pegs will show the course for lockspitting. Care must be taken in laying down curves in this way to have all the lengths of the perpendiculars laid off at right angles to the chord, as a small deflection to either side will destroy the regularity of the loci: in long perpendiculars it will be found necessary, in order to come at the right angle closely, to sink a peg on the chord at say 18 feet from the starting point of the perpendicular, and with the ring of a measuring tape on this peg while the mark for 54 ft. is held at the starting point to sink another peg at the end of the 30th foot: a line drawn from the latter peg to the starting point of the perpendicular, will be at right angles to the chord.—Any other multiples of 3, 4 and 5 will answer the purpose equally well with 18, 24 and 30. The advantages of this method of laying down curves, for water-ways is that its simplicity brings it with-in the skill of an overseer or ganger, allowing the engineer to attend to the more important parts of his duties.

Earthwork is generally the most important item in canalling; and anything that may tend to economy in that head must be at all times interesting to the profession, and especially so at the present moment with such a magnificent work as the St. Lawrence and Champlain ship canal about to absorb a large proportion of the capital of the country. We will offer some few remarks on this item in canalling.—The contractor where one is employed, or the engineer where a work is executed directly by himself, will find it advantageous to divide the whole into a series of lots, letting each to a ganger as representative of ten or twenty men. The means of carrying out this system may be defined most clearly by detailing them as pursued by the writer in a line of very heavy unbroken excavation, the spoil being all wheeled on an average of about 45 yards.—After lockspitting both sides of the intended cut, the whole was divided into the shortest lengths consistent with the proper distribution of the men. Pegs were sunk at the begining, middle, and end of each lot; and these being connected with a fixed bench mark were all numbered by notches on the head, the depth of cutting below each being registered in the instruction book of the overseer in charge of the division to which the depth referred. The means of ascertaining these depths, though of course familiar to many members of the profession may yet be of some interest to others; and we will therefore explain it for the information of the latter.

Dungolman Navigation—Depths for the Newcastle Cutting.

No. of Peg.	Staff.	Line of Collimation.	Reduced Level.	Level of Bottom.	Depth of Cutting.	Remarks.
	2·18	96·24	94·06	80·20		B. M. No. 9.
1	5·29		90·95	80·30	10·65	Pegs sunk at intervals
2	7·32		88·92	80·40	8·52	of 352 feet: and the
3	6·48		89·76	80·50	9·26	rate of inclination
4	8·00		88 34	80·60	7·64	being 1¼ ft. per mile
5	7·45		88·79	80·70	8·09	is 0·10 per peg.
6	7·32		88·92	80·80	8·12	

These particulars are taken at random to illustrate the method of ascertaining the depths of cutting, the initial depth been taken carefully from the working section. After having registered the cuttings in the overseer's book a boring was next made in each lot, and when circumstances required such, two or three borings were made in each. The material was then registered for the several lots, and the price of each lot determined from the registry in the following manner.

Lot 1.—60 feet wide at top, 40 at bottom and 9 ft. deep.

Loam—2½ ft—quantity in lot—at—p. yd.—amt.—
Stiff blue clay—3 ft.—Do.——at—p. yd.— do.—
Hard gravel—3½ ft.—Do.——at—p. yd.— do.—
Total amount—

The quantity of each material was calculated from the intended section for the depth furnished by the borings; and as a fixed scale of prices for raising the several kinds of material from any one 'lift' between top and bottom was adopted throughout the whole number of lots, the results produced by each gang, being by this means referred to one and the same standard, furnished some very interesting facts in manual labor—facts which we shall state hereafter in the pages of this journal. Having had the particulars of each lot registered in the overseer's book in the form of a contract, and a copy made of each of these forms, the lots were let in regular succession each to a gang-leader chosen by themselves as representative of a gang of men. This gang-leader, nominated by ourselves for his intelligence and good character, subscribed the contract of his gang on the part of the gang of men, and the overseer endorsed it on the part of the employers.—At the end of each fortnight the work was measured, and the amount excavated during the fortnight paid for at the rate fixed for the material excavated and the depth from which it had been raised. There was no necessity for withholding any deposit as security for the finishing of the contract, inasmuch as the contract was so regulated that, the bottom 'lift' and the harder material being paid for proportionably higher than the upper lifts or softer material the part of the contract remaining unfinished at any period of its execution furnished as nearly as possible as good a rate of pay as any other part of it. Boulder stones, being measured on the bank, were paid for by the cube yard at the difference between the average price of the lot and the value for material, of that sort. Plant and tools were supplied by ourselves. The overseer was instructed to direct the gang-leader in laying in the 'runs,' placing his men, distributing the excavation, the lifting, the wheeling, and instructing the men generally in all the details of an economic system of labor. When rock occurred the blasting also was done by task, the quarry men only being paid by the day. The boring was done by the foot; and the repairs of jump-

ers, hammers, tamping irons, etc. were also paid for by the foot bored. Of fifteen hundred men engaged on these works only from 15 to 20 were employed otherwise than by task; and this fact will show that a system so injurious to the men and expensive to the employer, as the day-work system may be almost entirely dispensed with by a little skilful management.

Every practical Engineer and contractor is quite aware of the demoralising influence of day-work; and the evil, affecting indeed both workman and employer, is so very great to the workman that we lay great emphasis on the benevolence as well as the economy of adopting the task-system, where at all practicable. On the works referred to above, the morals of the men were singularly served by this system of labor. The gangs were roused to increased exertion by the direct interest they were given in their labor, and by the competition in which each gang was placed with that next above and next below it. Owing too to the inducements offered in such a case to the industrious man, and the sense of responsibility felt in his position as a *contractor*, a remarkable change took place in the character of the men after passing through a few pay days under this system. Indeed, so well disposed and disciplined were the whole force employed on the works, that after some eight or ten weeks we were enabled to reduce the staff of superintendance to very nearly one-half, and to execute the work, with a higher remuneration to the men, at prices varying from 20 to 30 per cent. less than those adopted in the outset.—A man of good character, every one acquainted with labor is aware will, all else being equal, do far more work within the same time than a man of bad character; and in connection with this we can offer no stronger recommendation of the task-work system than the fact, that, having been referred to by a police inspector in reference to an outrage committed in the neighborhood as to the character of the men employed on a certain portion of the work, we answered the inquiry quite to his satisfaction by a reference to the pay sheets of that particular division. M.B.H.

Pennsylvania.

York and Cumberland Railroad.

Messrs. Editors—Our citizens, I am sure, will be gratified to learn, as the result of a personal inspection of the whole line, that this most important work is in a state of rapid progress, and that its completion, quite within the stipulated time, is placed beyond a doubt. This highly satisfactory condition of the work is mainly attributed to the judicious course pursued by the company, in letting out the road in one aggregate contract, to a highly efficient, experienced and responsible firm, Messrs. Gondor, Burke and Co. The iron, which is to be the bridge or U rail, and weighing sixty pounds to the yard, has been contracted for, in England, and it is to be all delivered in Baltimore before the first of March next.

The Stockholders will also be pleased to learn that this investment is destined to be directly profitable to themselves, as well as promotive of the general interests and trade of the city. A sum equal to six per cent. per annum on its cost is now offered to the company, as an *annual rent* for the use of the road, to take effect from the day of its completion.

The Executive Committee, through whose persevering exertions, in connection with the President and Directors, the money was raised and the company organized, are certainly now entitled to claim an honorable discharge; there pledges have all been faithfully and honestly redeemed, and the money is now being applied by the company with the most rigid and scrupulous economy to the construction of the road, and I have not a doubt that the most sanguine expectations of its projectors will, in the end be more than realized.

The success of this undertaking, as well as the present highly satisfactory condition of the other various and important enterprises in which our city is engaged, serve to demonstrate that Baltimoreans are quite as competent to judge of and manage their own business successfully as the people of any other section of the Union.

The fact is too frequently lost sight of by our desponding and nervous citizens, that Maryland was a *pioneer State* in the system of Internal Improvements, and that she has exhibited a higher degree of liberal enterprise and expended her capital much more freely in this way than any other State in the Union, in proportion to her population and means. She had to purchase at a high price, the experience by which *other* sections of our country have since profited so largely; but she now has the experience and is using it.

We have every thing we could ask to encourage and stimulate us to prompt, vigors and manly exertion, and if Baltimore be distanced in the race, and fail to reach the highest point of commercial greatness and prosperity, it will be owing entirely to the absence of the qualities, without which she has no claim to success.—*Baltimore American.*

Tennessee.

East Tennessee Railroad.—We should not be very much surprised, says the Mountain Eagle to see a locomotive enter the State of Tennessee in the direction of Knoxville, before one penetrates it in the direction of Nashville. We were up the line a short distance, a day or two ago, and were astonished at the forward state of the work. There are at this time, a force of four hundred hands operating on the first sixteen miles of the road, as we learn from Mr. Prichard, the Engineer in charge of the work. Gen. Green, the contractor of the Road, passed through our town on Friday last, on his way North, to perfect some his arrangements for the elevation of Dalton and the improvement of East Tennessee and Northwestern Georgia. We wish him the most abundant success. If he succeeds in effecting one half of his plans—we do not mean to express a doubt of his success.—*Atlanta Intelligencer.*

Virginia.

South Side Railroad.—We learn from the Petersburg Intelligencer of the 7th inst. that the Petersburg Railroad Company has effected a contract with Mr. Jas. Dunlop, of Petersburg, (who is agent for an extensive iron manufactory in England,) for heavy T rails sufficient to relay this track as far as the junction of the Greensville Railroad. This (says the Intelligencer,) with the iron already laid, will make 45 miles, which will complete the rebuilding of their road as far as their heavy trade is carried. At a meeting of the City Council of Petersburg on the 1st of August, M. G. W. Bolling offered the following preamble and resolution, which were unanimously adopted:

The people of the town of Petersburg, in town meeting assembled, having on the 20th day of July, 1849, instructed the Common Hall to subscribe for 1,000 shares of stock in the South-Side Railroad Company, on behalf of the town, in addition to the amount of the Petersburg Railroad stock already subscribed. Therefore,

Resolved, That the Mayor be, and is hereby authorized and directed to subscribe, in the name of the Corporation of Petersburg, for an additinal one thousand shares of stock of the South-Side Railroad, in obedience to the said instructions of the town meeting of the 20th of July, 1842.

We understand that this company was organized on Wednesday last by the election of the following officers:

William Pannill, of Petersburg, President.

Robert P. Bolling, George W. Bolling, and Archibald G. Mellwaine of Petersburg, John W. Gilliam of Dinwiddie, and Edwin G. Booth of Nottoway, Directors.

Efforts are to be made to commence operations on the work speedily, and with that view the President has already advertised that the Board of Directors will proceed on the 1st September to the appointment of an Engineer.

Indiana.

Madison and Indianopolis Railroad.—The receipts and expenditures of the Madison and Indianopolis railroad company, for the six months ending June 30, 1849, were as annexed:—

MADISON AND INDIANAPOLIS RAILROAD.

Transportation of freight and passengers	$114,103 94
" United States mail	1,488 36
" Iron and timber for new track	2,814 00
From old brass &c., sold	255 41
From wood sold	25 00
Making a total of	$118,686 91
Actual expenses $57,824 27	
Add loan of 1848 repaid, 6,000 00	63,824 26
Net earnings	$54,626 65
Divided at four per cent	51,000 00
Surplus	$3,865 65

The payment from permanent funds during the six months have been as follows:—

For new track	$50,622 67
" Construction Accounts	11,040 98
" Ground for Madison Depot	13,427 56
" Improvement of Plane	5,313 99
" Wharf at Madison	1,484 12
" Madison Passenger House	537 82
" New machinery, (purchased in 1848)	20,772 20
Making a total of	$109,198 34

There has been laid, since the opening of spring, about eight miles of new heavy rail; and the materials are all provided, and, with the exception of the iron, (which is now arriving,) are on the ground to complete eleven miles more, which will finish the heavy rail to Edinburgh by the 1st of September.

The earning for the first six months this year, exceed those for the corresponding six months in 1848, $18,983 25, which was principally from the freighting business of the company.

New Hampshire.

Manchester and Candia Railroad.—The first meeting of the grantees of this road was held in this city last Saturday, and was fully attended. Richard O. Ayre was chosen Chairman, and David Currier of Auburn, Clerk. The charter was unanimously accepted. The grantees fixed the capital stock at $150,000. Messrs. R. H. Ayer, J. T. P. Hunt, W. G. Means, and I. C. Flanders of this city, F. G. Stark of Bedford, A. W. Haven of Portsmouth, H. Cronbie of Auburn, T. W. Gillis of Nashua, and J. D. Patterson of Candia, were chosen a Board of Managers, to manage the affairs of the corporation till $100,000 of the capital stock shall have been subscribed, when they are to call the subscribers together for the choice of Directors and transaction of other business.

Mr. Hudson.

The papers are filled with speculative statements respecting Mr. Hudson's property and liabilities, but little reliance can be placed upon them. It is certain, however, that he has been selling property to meet the heavy demands for restitution made upon him. *Herapath's Journal*, which is generally well informed, has the following:—

Landsborough Estate	£470,000
Baldersby ditto	108,000
Orton Grange	80,000
Newby Park	22,000
Albert Gate	18,000
In Clay Cross Colliery	30,000
„ Newcastle Glass Works	50,000
Furniture at Albert Gate and Newby Park, say	20,000
Plate purchased and presented to him, including Mrs. Hudson's jewels	15,000
Left him by Mr. Botterill, an estate bringing in £1,500 per annum	32,000
	£845,000

This is exclusive of his shares in the York, Newcastle, and Berwick, the York and North Midland, the Midland, the Eastern Counties, and perhaps other railways.

"It is evident from the above sketch, that had Mr. Hudson been contented with the profits he could have fairly made, he migh have realised some £200,000 or £300,000 and been now respected, whereas the possibility, if not the probability is, that all may be wrested from him to make restitution for improper conduct, and he himself die in poverty as well as in disgrace.

We hear that he has lately sold the Octon Grange for £80,000 having given £70,000 for it.

A letter from Mr. Close, the Secretary of the Berwick line, was posted in the Stock Exchange on Thursday, accompanying returned transfers, of shares in that Company refused to be registered, which Lawrance, Cazenove, and Co., of London, had sold for him.

Yesterday the following letter was received by Mr. Slaughter, Secretary to the Railway department of the Stock Exchange :

"*York, Newcastle, and Berwick railroad.*
" Secretary's Office, York, July 26th, 1849.

" Dear Sir,—In reply to yours of the 25th inst, I beg to inform you that the answer I wrote to Mr. Furlonger, on the 23rd instant, was in consequence of directions from the Committee of Inquiry. The transfer of the shares being passed this day, further explanation is unnecessary.

(Signed) " John Close, Secretary.

"Mihill Slaughter, Esq., Stock Exchange, London."

AMERICAN RAILROAD JOURNAL.

Saturday, August 25, 1849.

The Iron Trade.

This great branch of national industry continues very much depressed, without any prospect of immediate improvement. Nearly every mill in the country for making railroad bars, if not every one, has suspended work : and we may calculate upon a general abandonment of the manufacture of pig and most kinds of bar iron, unless it is further protected by the revenue laws of the country, or unless an entire revolution takes place in our social condition, bringing about the same state of things that we now witness in Great Britain, the country from which we draw most of our supplies of this article.

It is a remarkable geological fact, that most of our beds of iron ore in this country are remote from the sea shore, and also from our most available coal fields. On the other hand, the Scotch and Welch beds of ore and coal are contiguous, and are in the immediate vicinity of tide water; consequently the iron made from them can be laid down at as low a cost for transportation, as the iron from most of our furnaces. We enjoy, therefore, no protection by virtue of our position, and all that we have is by virtue of the duty of 30 per cent. ad valorem, which is by no means equal to the advantage enjoyed by the English manufacturer, in the low rate that his money and his labor cost him, compared with the American manufacturer; for it must be borne in mind that the cost of the raw material is not more than one-eighth or one-tenth of the whole cost of a ton of iron. The pay of the English operative is measured by what is necessay to feed and clothe him. Americans, at present, will not work at this rate of wages; they will turn their hand to something else, or lie idle rather. The result is, that our iron manufacturers must quit their business or fail. Only these two alternatives are presented to them; and we regret to say that one of the two is being followed with great rapidity.

"But," says the free trader, "this is all right; let us buy where we can buy the cheapest, and if we can buy English iron at a less sum than we can make iron ourselves, the difference is just so much saved, in a national point of view. We must turn our attention to the production of something else that we can produce at a less cost than we can buy it at. We shall then know just where we stand, and our labor will then be the most profitably employed. Here is a simple and undeniable truth to stand upon; and the moment we leave it we are involved in error, and in the broad road to partial legislation, by which one branch of industry is taxed to support another that cannot stand without it, on its own merits." Very well, let us examine this fundamental principle laid down by the free trader, and see where it will lead us.

Whatever is true of iron, is true of every other article of general consumption, which we can purchase at a less cost than we can manufacture. It is our true interest, therefore, to devote ourselves to agriculture, in which, from the peculiar state of things in this country, we can probably compete in most kinds of products with any nation on the globe. In some parts of Europe they probably can produce wheat at a less cost than we can in this country; but in most other products we excel them. To the production of these articles, therefore, according to the free trader, our industry and capital should be devoted.

As we must buy then from other nations what they can produce at a cheaper rate than we ourselves, we must pay for these things by the sale of those products in which we have the advantage over them. But it appears that many of our most valuable agricultural products, such as hay and potatoes and the coarse grains, from their great bulk compared with their value, derive their value from the demand that exists for them in the immediate vicinity of their production.—Many of our States are better adapted to the production of these articles than anything else. They therefore have nothing to offer the English, Welch or Scotch manufacturer in exchange for his products.—They can produce an abundance of those articles for which their soil is adapted, and would find no difficulty in supplying their wants, if those having the articles in which they stand in need would exchange them for hay or potatoes. But the cost of transportation forbids the idea of sending them to Europe. If the manufacturer would come to this country and set himself down in their midst, then this exchange of products could be effected at their full value, and the farmer would have it at once in his power to supply all his wants, by a ready sale of what his farm was adapted to produce. The effect of high duty is to say to the English manufacturer, " if you wish to supply our farmers with iron, you must take in exchange what they produce, and if you cannot afford to transport these products to the scene of your own operations in England, you must transfer your establishments to this country, where you can purchase them without being subject to the cost of transportation."

We cannot better illustrate the advantages of a home market, than to take the case of a farmer in the interior of Virginia, and compare it with what would be his condition, if placed beside some of the large manufacturing establishments in Great Britain. In his present condition, all his abundance only enables him to supply his ordinary wants, without giving him the means of gratifying those that belong to his higher nature. The dense forests by which he is surrounded are regarded only as an evil, as they must be removed before he can till the soil on which they stand. Every kind of agricultural product, adapted to his soil and climate, he can produce in the greatest profusion; but only so much of these are valuable as are necessary to the support of his family. All his neighbors are similarly situated with himself, and he is too far from market to send his surplus to it. The price they would bring there would not pay the cost of transportation. His lands, though fertile in the extreme, are worth but little, because they can furnish him with only what he can eat and wear. They may cover the finest beds of iron and coal in the country, without being a cent more valuable, as these cannot be worked on account of the low price of foreign iron and coal. Now place the same man, surrounded by the same external circumstances, in some of the densely populated manufacturing districts of Great Britain. All those articles which were formerly worthless, and some of which were impediments to his industry, now become the most valuable. The forest, which once cost him so much labor to destroy, his hay, potatoes, grain, his beef and pork, all meet with a ready sale at the highest prices. He is now made rich by the sale of the surplus which once rotted on his farm, and he is in a position not only to gratify his ordinary wants, but those of a higher nature—in fact, he now possesses whatever wealth or society can bestow, and his lands have become, in consequence, fifty times more valuable than before.

But the same demands exist in Great Britain for his products, whether he remains a farmer in Virginia, or whether, as we have supposed, he is transplanted into that country. It is precisely the same in both cases. The only difference is, that in the latter case he is not subject to the cost of transportation, which in the former was an effectual bar to the supplying this demand. It is the nearness to, or distance from, a market, that determines whether his productions are valuable or worthless.

The greater number of our most valuable productions then can never be made the subjects of a foreign commerce, even under a perfect system of international free trade. Cotton and breadstuffs must always make up the great sum of our agricultural exports.—Our local position and the adaptedness of our soil and climate to the culture of this plant, undoubtedly secures to us the monopoly in the growth of cotton.—Such is the ground maintained by the cotton planter. European nations must, from this cause, draw their main supplies of cotton from the United States, equally, whether we adopt the free trade or protective policy. With regard to breadstuffs, Great Britain is the only country in Europe that offers any market for them, and all we can expect here is the privilege of making good a short crop, or supplying the little deficiency that may result from an ordinary one. Under the most favorable circumstances for us, we can export to that country only a very small portion of our surplus of these articles. But the adoption of free trade would not increase even our exportation of breadstuffs.

The commercial and financial policy of Great Britain is now clearly defined. Superior skill, and her great advance in the mechanic arts, enabled her, by many years to anticipate all other nations in the use of the steam engine, and in the introduction of labor-saving machinery as manufacturing agents. These gave her a monopoly in almost every branch of manufacturing, and enabled her to supply the whole world with her fabrics at her own price. So long therefore as she could control the markets of other countries, her manufacturing interests from the enormous profits they were able to make, could well afford to pay high for food, as well as for the raw material of their fabrics. She therefore gave, by the most restrictive legislation, to her agricultural interests, the monopoly of supplying her manufacturing population with food, and subjected to high duties all the material which formed the basis of her manufactures. This system of legislation was not felt to be a hardship till the manufacturers began to lose the monopoly they formerly enjoyed. Stimulated by her example, other countries, formerly dependent upon her, commenced the work of manufacturing, which was encouraged by their respective governments by an imposition of a revenue duty upon the foreign article; and Great Britain not only found herself shut out from the markets she once enjoyed, but found those nations rivals in foreign markets for the sale of those very goods for which they were once dependent upon that country. If she had superior skill, and possessed the advantage in all the great elements of manufacturing industry, the enormous prices she was compelled to pay for food for her operators, and for the raw material for her fabrics, more than counterbalanced her superiority in these respects. Great Britain undoubtedly possesses greater capacities for cheap manufacturing than any nation in the world. She has an abundance of labor at the lowest cost, an enormous amount of capital, skilful artizans and mechanics, cheap

motive power in her numerous coal fields, and the best climate in the world for the development of a vigorous physical constitution. Having lost the position she once enjoyed from the policy of other nations who have copied her example, she now finds that her true interest lies in adopting a policy precisely the reverse of what she once pursued. Her monopoly in manufacturing can now only be restored by breaking down all barriers to trade and commerce, and leaving the manufacturing establishments of each country to succeed or fail, according as they possess or lack the elements of success when compared with each other. In such a contest there can be no doubt that Great Britain would come off victorious. Universal free trade is therefore the sovereign panacea for the ills under which she is laboring from the depressed condition of her manufacturing establishments, and the general adoption of this policy the only thing wanting to restore her ancient manufacturing monopoly. As a part of her policy she will therefore continue to admit free of duty, breadstuffs and cotton, which enter so largely into the cost of her products, because if she would succeed in her new line of policy she must possess every element of cheap production. Any course that our government should adopt therefore in the protection of its manufacturing establishments, would have no influence for some time at least, upon her present policy. She will continue to purchase our staples just as largely, whatever policy we pursue.

"But," says the free trader, "why should we be compelled to pay a premium to the American manufacturer in the increased price we are obliged to pay for his products, and give him a monopoly which we refuse to Great Britain, by which he can amass a fortune at our expense." Granted that you are obliged to pay a higher price for what you are compelled to purchase; we think that we have conclusively shown that you are more than made whole by the wider markets that are opened for you products. Protection gives you what you lacked before—means of payment. But we deny that protection gives the manufacturer any monopoly in the true sense of the word. Take for instance the cotton manufacturer in the United States. Has he any monopoly? Not the least. Every man among us may commence this business at once if he chooses. Would the exclusion of coarse foreign cottons give him such monopoly? No. There is an abundance of capital in this country, and capital will always flow in that direction where the most money can be made, till it ceases to offer any greater return than money invested in other pursuits. In the long run, by the operation of a law as certain in its results as the law of gravity, the cotton manufacturer is paid just as well and no better than the iron manufacturer, the wheat grower, or the cotton planter. There is no more mystery about one of these occupations than another. Each one will invite capital just so far and no farther, as it can pay better or as well as the other. There can be no monopoly therefore in the production of an article for which every portion of the country is well adapted, and in which there is perfect freedom for competition.

"But," says the free trader, in the last resort, "the protected article costs us more than the imported one." We will admit that such may be the case, but we contend that the reverse is more likely to happen. Was Great Britain content with a fair profit, when she enjoyed in monopoly in manufactures? No. She made us pay three or four times more than the cost of her goods. She had the control of the market, and wrenched every cent out of us that she could get. If she regains it, will not the price of her products be measured exactly by our wants, and by our inability to help ourselves? In this respect is not the past history of that country a sufficient guide for the future? With the adoption of free trade, will she adopt a system of universal benevolence, and sell her products at just what they cost? This is not her history. For centuries her whole aim has been to make every other people either by her arms, or her commercial policy, subservient to her interest, to draw from them the means to support her enormous civil, military and church establishments; to make all other nations hewers of wood and drawers of water to her nobility, her hierarchy, and her privileged classes; and her new doctrines of free trade have for their only object the continuance of this supremacy, and her monopoly in free trade would be as onerous to us, and as much to be dreaded, as was the monopoly of superior skill, wealth and position.

We think therefore that we have conclusively shown that the principle of free trade will secure us nothing that we do not now enjoy. That the adoption of further protection will not necessarily increase the cost of the articles we protect, while on the other hand, the encouragement of manufacturing establishments among us would vastly increase the value of every man's property within their influence. That even if he was compelled to pay a higher price for what he wants than the English manufacturer would *ask*, these very establishments create for him the means of payment which he lacked before, and increase his ability to buy ten fold; and we cannot but hope that arguments so simple and plain as these we have given, and at the same time so conclusive, will have such an effect upon the next Congress, as to induce that body to extend a suitable protection to so extensive and important an interest to the whole country as that we have been advocating.

Boston and Maine Railroad Company.

Our readers will recollect that on the 28th day of May last, a meeting of the stockhoders of this company was held at Exeter, New Hampshire, to decide upon the question of accepting the act of the Legislature of Massachusetts, authorising the issue of six thousand shares of capital stock. At this meeting much dissatisfaction was manifested by the stockholders in the company, in consequence of the great reduction in the value of its stock, which, in common with other roads in this state, had recently taken place from their ascertained inability to continue the payment of the usual high rate of dividend. Waving therefore any action upon the question immediately before the meeting, the stockholders came to the determination, to institute a thorough and rigid examination into the affairs of the company for the purpose of getting at their true condition, and determining the value of their property; and a committee consisting of Edward Crane, John S. Wells, Albert Smith and John Lowe, Jr., were appointed to whom were referred the following vote, with instruction to report upon the same at an adjourned meeting, viz:

Voted, That the act of the Legislature of May 2d 1849, authorising an increase of the capital stock of this corporation, be referred to a special committee of five members thereof, with instructions to examine all the books, accounts and proceedings of the corporation and it officers, and to report to an adjourned meeting, the result of such examination, embracing the following facts and information:—

1st. The capital stock already issued.

2d. The amount absolutely sold, and the sum paid in for the same.

3d. The amount, if any, conditionally or otherwise disposed of—to whom—for what consideration—and the present situation thereof.

4th. The amount actually expended for construction, distributed under proper heads.

5th. The amount of debts of the corporation, distinguishing the ascertained and liquidated debts—floating and unsettled debts, and contingent and disputed claims.

6th. The proposed and unfinished works of the corporation, together with estimates of the probable cost of each, so far as the same should be made a charge upon capital stock.

7th. A schedule of all the property of the Corporation, real and personal—the nature of the title thereto, whether in fee, by lease or otherwise—where situated—the income derived from it, with their opinion of the expediency of selling or leasing any part of the same.

8th. What retrenchments can properly be made in the expenditures of the corporation.

9th. Their opinion as to the amount of capital necessary to be created to complete proposed and unfinished works, which they may deem advisable to have completed, and set the corporation free from debt; and also such information as it may be considered important to lay before stockholders; and that said committee be also instructed to prepare and present at said adjourned meeting, such rules, restrictions, and recommendations in addition to those now in force, for the consideration and adoption of the stockholders then assembled, as they may deem for the interest of the corporation; and said committee shall have power to examine persons and papers, and employ a clerk if it be found necessary, to prosecute the inquiries embraced in this vote.

The committee have acted upon the matters submitted to their investigation, and have presented their report to the public; and as it contains matter of great interest, and as the uniform depreciation of railway property in Massachusetts is undoubtedly referable to similar causes, and the results it has established are equally applicable to other roads, and as the report presents in a connected form, the history of the progress and operations of one of the leading Massachusetts railroads, we shall make no apology for presenting the substance of the report to our readers.

The Boston and Maine railroad has been constructed under authority of various acts of the several States of Massachusetts, New Hampshire and Maine. It extends from the city of Boston to the town of South Berwick, Maine, where it unites with the Portland, Saco, and Portsmouth railroad, a distance of 74¼ miles, having 19¼ miles of double track, and branches to the towns of Midford and Methuen, in Massachusetts, and Great Falls, New Hampshire, amounting to 10¾ miles, making an aggregate of 85 miles of road in addition to the double track.

The amount of capital authorised to be issued by the several states is as follows:

BY ACTS OF MASSACHUSETTS.

In 1833, March 15th	1,000	shares
1835, April 7th	2,000	"
1837, April 5th	1,000	"
1839, April 3d	1,500	"
1844, March 16th	5,000	"
1845, March 7th	1,000	"
1846, March 3d	5,000	"
1849, May 2d	6,000	"
	22,500	

BY ACTS OF NEW HAMPSHIRE.

1835, June 7th	6,000	shares.
1839, July 2d	5,000	"
	11,000	

BY ACTS OF MAINE.

1836, March 30th	12,000	shares
	12,000	
	45,500	

Of this number there have been issued at different periods, 36,720 shares, of which 1,000 shares have been pledged to the state of Massachusetts, and 153 shares to the Haverhill Savings Bank, as collateral security for debts due from the corporation, all of which are held without right to dividends, leaving 35,567 shares actually issued and sold,

As follows, viz:

1835, June, to 1838, June	(at par.)	2378	shares.
1838, June 10th,	(at $60 p. sh'e)	622	"
1840, February 1st,	(at par,)	66	"
1840, " 20th,	(at auction average a $75 10 630-1169)	1170	"
4841. July 19th,	(par,)	30	"
1842, January 1st,		1945	"
1843, January 2d,		114	"
1843, July 3d,		160	"
1844, January 1st,	(at par,)	1721	"
1844, July 1st,		956	"
1844, October 21st,	(at $8 advance per share,)	100	"

1844, November 11th,	($75 ")	1456*	"
1845, January 14th,	($10 ")	20	"
1845, " 16th,	($10 ")	20	"
1845, February 5th,	(at par,)	5196	"
1845, April 12th,	"	2	"
1845, July 10th,	($10 advance per share,)	1190	"
1846, January 1st,	(par,)	42	"
1846, February 4th	$10⅝ & 11 ")	24	"
1846, " 6th,	($11 " ")	11	"
1846, " 10th,	($10⅝ " ")	7	"
1846, July 1st,	(par,)	3912	"
1847, January 1st,	(")	40	"
1848 " 1st,	(")	5938	"
1849, " 1st,	(")	5826	"
		35,567	

Cash received from sales of stock, $3,475,054 52
Due for assessments from sundry parties, 1,200 00

Total amount of capital stock, $3,478,054 52
Average amount received for each share, $97, 78 8-10.

The whole of the above stock has been unconditionally sold.

It thus appears, that, of the 45,500 shares of stock which have been granted to this corporation, 35,-567 shares have been sold, 1153 pledged as security for debts, and that eight thousand, seven hundred and eighty shares are, therefore, now subject to issue and sale.

Amount expended for construction.

Graduation and Masonry.....843,532 27

Bridges.

For bridges between Boston and Wilmington.....203,470 83
For the remainder of the route.....155,213 05

Superstructure.

The items under this head in the Treasurer's books up to June 11, 1849, amount to..935,201 50 —935,201 50

Machine Shops.

Cost of Island on Charles river, and Engine House & Machine Shops on same.112,385 41
Freight House and Machine Shops at Andover, now abandoned..... 22,091 12
Machine Car Shops and Engine House at Lawrence.. 77,508 02 —211,084 55
Depots and other buildings..206,186, 21

Land, Land Damages and Fencing.

In Massachusetts.....554,768 49
In New Hampshire.....118,844 31
In Maine..... 10,739 79 —684,352 59

Motive Power.

Locomotives.....121,050 00
Cars of all kinds.....178,250 00 —299,300 00

Deduct difference between Superintendents and Treasure's statements..... 6,981 64 —292,318 36

Miscellaneous.

Engineering and other expenses.....259,508 85
Showing aggregate outlay for construction up to June 1, 1849.....3,791,808 21

Estimated cost of proposed and unfinished work.

To complete the double track to Lawrence 22,388 46
For Depot at South Andover..... 8,000 00
" North " 4,000 00
" Melthuen..... 3,000 00
" Lawrence..... 34,000 00
To complete Methuen Branch..... 8,000 00

Total for completing unfinished and proposed work.....$80,388 46
Estimated amount required in course of the next two years to put the road in good condition.....45,895 84
The real estate owned by the company, and not used for road is valued at....311,134 15
Of which the committee advise a sale of what is valued at.....27,650
The amount of rent upon the property of the company is..... 8,034 00
Personal property in addition to the items above given is stated as follows:
Lumber valued at..... 1,500 00
Wood.....28,004 79
Stationary Boiler at Andover. 2,000 00
Stock in Car and Machine Shop.....41,684 77
Stock in Penobscot Steam Navigation Co.....17,500 00
2000 tons rails..... 90 00
27,343 sleepers.....10,937 20
Other Items..... 445 00 —192,051 76

So much for a naked statement of the financial affairs of the company without reference to its debts. The committee then proceed to the subject of—

RETRENCHMENTS.

To this branch of their investigation, the committee have devoted considerable space. The machine shops of the company, at Boston and Lawrence, for making engines and cars, in the opinion of the committee, demand extensive curtailment. The shop (and tools) in Boston cost $77,585 97, and the annual expense of keeping it in operation is $87,310 03, 92 men a month on an average being employed.

The cost of shop and tools at Laurence was $60,-008 02, and it is operated at an annual expense of $77,104 16, 76 men a month, on an average being employed.

The cost of labor and the materials in these two shops, for 18 months prior to 1st of June last, was 246,621 20, and the total value of cars and engines manufactured in them during that period was $88,-075—leaving *a balance against the shops* of 158,546 20. It appears, however, that other work, to the value of about 75,000 dollars, was done, which ought to be credited to the shops. With this credit, there would be a deficit of over 80,000 dollars.

In relation to this matter, the committee say that they are clearly of opinion, that such manufacturing establishments, even under the most judicious management, are not expedient as appendages to railroads. From the most diligent inquiry, they have not been able to learn, that any railroads which have embarked in such experiments have realized an adequate remuneration therefor. That they have examined several in the vicinity of Boston, and found none to be compared in extent, to those of the Boston and Maine railroad. The shop at Roxbury, belonging to the Providence railroad, is conducted as well at least as any other. It is small, and operated in the most systematic and economical manner by Mr. Griggs, who is both Engineer and Clerk. His average force upon all works on wood and iron has been but 30 men, with which he has constructed eleven first-class Locomotive Engines, within the last four and one-half years—three of them having been put upon the road the past year. He has also done all the repairs upon the road, and made the Frogs, Switches, &c. In June last, he reduced his force to nineteen men, including himself. The motive power for operating all his machines, cost less than $800; whereas, that in two establishments of the Boston and Maine, cost about $12,000.

Before forming a definite opinion as to the proper course to recommend for your adoption, in regard to these establishments, the committee prosecuted their inquiries into the concerns of several of the large establishments in the vicinity of Boston, under the management of private individuals.

In the car shop of Messrs. Davenport, Bridges & Kirk at Cambridge, the average number of employees is 150; and the aggregate monthly amount of the pay roll is $5400. With this force they turn out work to the amount of $300,000 annually.

From the statement of the operations of the Boston Locomotive Works (late Hinckley & Drury,) as made to us by their Treasurer, Mr. Childs, there were manufactured at their establishment, in the eighteen months prior to July 1, 1849, ninety-nine locomotive engines, together with stationary engines and supplies, for railroads and other corporations, and private individuals, amounting to $820,-157 97.

For the same period, their
outlay for labor was.....$177,874 96
" " " " materials..... 503,198 86 —$681,073 82
Leaving for profit, interest, insurance, and taxes.....139,084 15 —$139,084 15

The information derived from these investigations, has satisfied the committee of the inexpediency of continuing the manufacture of engines and cars; and in the large outlays made to carry on the operations of the engine and car shops, they think they have discovered one of the principal causes of the present condition of the finances of the company; and that with the retrenchments and curtailments, which can be properly applied therein, a very great saving may be made to the road.

The undersigned have endeavored to discover by a careful examination of the records of the proceedings of the Directors, how it was, that the large expenditures for the construction and furnishing of these establishments, were permitted; but they have been unable to find any authority therefor, by any vote of the Directors, therein recorded. No plans or estimates in relation to them are therein referred to and the committee are therefore, irresistibly left to infer, that they were carried on without any plan or estimate submitted to the Directors for their actions, or any vote directing or permitting them. Indeed, some of the Directors have so informed the committee; and the President himself has declared, that "he had never stepped his foot over the threshhold of the car shop at Lawrence."—But they find, that all the bills for their construction, and for the elaborate and costly machinery and tools contained in them, have been presented and paid.

A list of the several employees of the company connected with the road and the shops, with the pay of each is given in the report. From this it appears that the total number of employees is 430, and that their aggregate pay is $177,313 50. The committee believe that by a proper distribution of labor, and a systematic concentration of business in the different departments that many important savings may be made, aside from what would follow the reduction of force in the manufacturing establishments. The subject of free passages is considered and some important facts stated in reference to the same. In May last including the free passages to the stockholder's meeting, 5,017 passengers were carried over the road without fare; in June there were 3,199: and in July 2,390. They recommend extensive curtailments in the free list and that it be confined to the directors of this road and of the various roads connected with it. In relation to the amount of new stock necessary to place the company out of debt, they recommend an issue of $6,220 additional shares, which will raise the capital stock to $4,1000,054 52. This it is believed

* Being the stock of the New Hampshire, Massachusetts and Maine railroad.

will amply provide for all the necessities of the company. The committee recommend that in future all repairs of the road and the appurtenances thereto, and all alterations, improvements and reconstructions, buildings, bridges, engines and cars hereafter made be charged to working expenses;—and further that a sufficient annual sum should be set aside as a sum to keep the road in a permanent good repair.

Two full and valuable tables of the receipts of the road are given, from which it appears that the total amount of receipts for the year ending June 1st, 1849, was $484,511 90. Expenses of the road in this period $240,691 14.

In regard to the future prospects of the road the committee state after having specified some of the sources from which an increased business may be expected to be derived, "that no one can reasonably question the ability of the corporation under an improved management of its affairs to earn for its stockholders an ample dividend upon their capital" They have annexed to their report a map of the road, "showing its position in the great chain of railroad which unites Boston with the remainder of New England, Canada and the Great West." At the close of their report the committee present the following suggestions:

1st. "The annual report of the directors should contain for the information of the stockholders as well as the public a full and perfect exhibit of the receipts from every source; and of all expenditures charged to construction, running expenses, depreciation or other objects, so that the true condition of the corporation may be fully understood.

2. "No construction of buildings, bridges or road should be permitted until perfect plans and specifications and estimates of the cost of the same shall have been submitted to and approved by the Board of Directors, and deposited with the Treasurer of the company for future reference.

3d. "These, and all other works upon the road where it is practicable, including the manufacture of the motive power, should be done by contract and not by days work.

4th. "After the completion of the road the construction account should be closed.

5th. "Liquidation should be shunned as far as practicable; but when unavoidable should be brought to a close within the shortest possible period."

The committee then recommend to the stockholders the adoption of certain resolutions, expressive of the opinion of the policy to be pursued in future in the management of the road. As these have been adopted in the main by the stockholders at a meeting for the purpose of receiving their report, we subjoin them as amended by the meeting.

RESOLUTIONS.

Resolved, That the Directors be advised to issue six thousand two hundred and twenty shares of the capital stock of this corporation, at one hundred dollars each, to be distributed among the stockholders, in the proportion of one share of new, to every six shares of old stock, held by any person, on the first day of September next; and that the sum of six hundred and twenty-two thousand dollars, being the par value of said additional shares, together with a sufficient amount of the assets on hand to be disposed of, be specifically appropriated to the following objects, viz:

For restoring the earnings of the road, heretofore applied to construction,	$101,615 28
" Bills payable,	203,154 54
" Outstanding Accounts,	140,671 82
" Bonds,	26,000 00
" Completion of additional track to Lawrence,	22,388 40
" Completion of Methuen Branch,	8,000 00
" Constructing a passenger station at Andover,	8,000 00
" Constructing a passenger station at Methuen,	3,000 00
" Constructing a passenger and freight station at N. Andover,	4,000 00
" Constructing a passenger and freight station at Lawrence,	35,000 00
" Contingent and disputed claims, to be paid when adjusted,	93,145 75
	$649,975 70

And no change or transfer of the whole or any part of the aforesaid appropriation, shall be made, from any one or more, of the above objects to another (except the interest which may have accrued upon debts,) without the consent of the stockholders previously had and obtained, upon a statement in writing by the Directors, setting forth the reasons for making such change: And it shall be the duty of the Directors to present to the stockholders, at their annual meeting, A.D. 1850, a specific and detailed statement, to be contained in their report, showing how the aforesaid appropriation has been applied, and affixing the sum which has been expended upon each object.

Resolved, That after the expenditure of the sum received for the aforesaid new stock, and also the sum of twenty-seven thousand nine hundred and seventy-five 79-100 dollars, from the assets aforesaid, the "Construction account" of the corporation shall be closed, and that thereafter the Directors, and other officers of the corporation, are prohibited from contracting any debt, to be charged to capital stock.

Resolved, That all bills against the company, both for expenses and construction, shall hereafter be approved in writing, by the President or a Committee of Directors, appointed for that purpose, before they shall be paid by the Treasurer; who shall in all cases receive payments due to the company, and cancel all claims against it, thus approved.

Resolved, That the Treasurer be directed to keep an account of all the receipts, at each depot and station, specifying the items of each, to be inserted in the annual report to the Directors.

Resolved, That the Directors be required to present in their annual reports, a tabular statement of the names of the conductors, engine men, and ticket masters in the employment of the company, specifying the compensation of each—the number of the firemen, of brakemen, and of the baggage masters, Mail carriers, employed upon the line, with the average compensation of each class—the number of men attached to each station, not in the aforesaid classes, their duties and compensation—and the number of laborers upon the line of the road, not attached to any particular station, with the average and total amount of their pay—all expenditures charged to construction, running expenses, and depreciation, or other object, so that the true condition of the company may be fully understood.

Resolved, That the force in the shops at the island be reduced to an adequate repair force.

Resolved, That the manufacture of engines and cars be discontinued, except so far as may be necessary to employ the force at the island, when not engaged upon repairs.

From what we can learn, the report was received by the stockholders with general favor; and the views expressed by the committee adopted with unanimity. The committee appear to have discharged their duties with great industry and fidelity, and the action of this company in instituting the investigation, will exert a very beneficial influence upon all other roads in Massachusetts, for we have no reason to suppose that the affairs of the Boston and Maine road, have been managed worse than roads generally in that State. They have all, with one or two exception perhaps, been constructed and managed on the same system. And any reforms applicable to one are applicable to the whole.

The report censures the management of the road in two particulars: in the expenditures on account of engine and car shops, and in allowing too large a free list. It may have been culpable on these two matters; yet we think if such be the case to the extent charged by the committee, that the report may be calculated to do the Directors injustice, by impliedly making their management responsible for the great depreciation in the price of stock, which has taken place within a year or two past. With the exceptions above named, it does not appear that the Directors have mismanaged their trust, or that their conduct have made the stock in the road any less valuable. The great mistake was the payment of higher dividends than the business of the road, compared with its ultimate cost would justify. The public were thus lead to put an erroneous estimate in the value of the stock, and it is that class who purchased under these circumstances who have cause for complaint, not the original stockholders, whose stock is nearly as valuable as it ever was.—We would here express our surprise that the committee should censure the directors for not issuing the 2780 unissued shares at a time when the stock commanded 18 per cent. premium, thus taking out of innocent purchasers who has no means of ascertaining the value of the property they were buying, 16 per cent more than its true value. We certainly think this suggestion of the committee is more culpable than any conduct we have seen on the part of the directors. As a general rule, we think that the conduct of the directors of the Massachusetts roads, has been guided by a desire to promote the interests of the works entrusted to their care.—They have made many mistakes undoubtedly; it is impossible that it should have been otherwise.—Railroads have been but recently introduced among us, and the best kind of management had to be developed from experience in working them. Taking all circumstances into consideration, our railway system has been remarkably well managed, and preeminently successful. Much more so than that of any other county. A year or two since a mania existed in Massachusetts on the subject of railroads. They were the true philosophers sone that were able to turn everything into gold. All classes were affected by this mania; and any road proposed, was sure to pay, and no one supposed that any extravagance would diminish the dividends of those constructed. Under the influence of this delusion, roads were started that never should have been commenced, and undoubtedtly much money was wasted upon lines already constructed. Directors felt and acted just as the public felt and acted. If they had not yielded to this impulse, they would have been more blamed than they are now. All parties have now recovered from the influence of this mania, and the poor directors are made responsible for all the mischief which resulted from it.—We object to this. We wish to see every class in the community take its share of the blame in which all are equally involved.

Alabama.

Mobile and Ohio Railroad.—The Mobile Register of 11th inst. says: We have the pleasure of announcing that the Directors of this Company closed a contract yesterday with Messrs. W. D. Ribdle & Co., for the construction of seventeen sections of the Mobile and Ohio Railroad, commencing at the Eight Mile Creek and extending to Cedar Bluff, a distance of twenty-six miles. The Road is to be graded and timbered, and put in condition to receive the iron rails, at the cost of about $160,000.

Connecticut.

Norwich and Worcester Railroad.—The reported receipts of the Norwich and Worcester railroad company for the month of July, 1849, amounted to $19,585 15, against $18,564 16 for the same month in 1848, showing an increase this year of $1,120 99.

Georgia.

The Burke County Rail Road.—The Georgian says: "The amount of stock subscribed thus far is $110,000, and will doubtless be increased to $150,000, of private subscriptions alone. It may exceed this amount. With the subscription promised by the city, the sum raised here will exceed $300,000, more than half sufficient to build the road. There is no doubt of its early commencement and completion. We have not heard from our friends in Burke county or Agusta, but are assured each will do their duty.

Vermont.

Rutland and Whitehall Railroad.—The grading commenced on Monday of last week. Before the travelling season next summer, this road is to be in running order, opening the communication to Saratoga from Boston, via Keene, Bellows Falls, Rutland and Whitehall; and ten miles in distance short of the Albany route, through the Western road.

AMERICAN PATENTS.

Tyler's Patent Safety Switch.

To the travelling portion of the public, switches are questions of life and death: if the humanity of railway directors fail to make them alive to the importance of improvements in those contrivances, surely their personal interests should not. Tyler's patent safety switch is the very best means we have seen for preventing those distressing accidents which occur every day to the great disadvantage of railways as means of travel, and as business investments. The switch referred to consists of a frame working on a pivot where the tracks diverge and carrying a few feet of the main and siding track.—A lever attached to the frame moves the switch over and hither, the motion terminating at two points; one bringing the main track of the switch to correspond with the main track of the line; the other bringing the siding track of the switch to correspond with the siding track of the line, and in such a manner that *whether the switch be placed for the siding or for the main track the frame presents an unbroken line of rail.*

We repeat that this is the best switch we have seen. The testimony of several railroad men throughout the country endorses our opinion—that while some minor improvements may be suggested in the details of it, Tyler's patent safety switch is decidedly the best switch yet invented, as the stops at which the lever-motion ends place the frame, provided only that the motion be made to end at one or other of the stops, in a position to make an accident, so far as the switch, main-track and siding are concerned, a matter of utter impossibility.

M.B.H.

Iron Safes.

FIRE and Thief-proof Iron Safes, for Merchants, Banks and Jewelers use. The subscriber manufacturs and has constantly on hand, a large assortment of Iron Safes, of the most approved construction, which he offers at much lower rates than any other manufacturer. These Safes are made of the strongest materials, in the best manner, and warranted entirely fire proof and free from dampness. Western merchants and the public generally are invited to call and examine them at the store of E. Corning & Co., sole agents, John Townsend, Esq., or at the manufactory.

Each safe furnished with a thief-detector lock, of the best construction.

Other makers' Safes repaired, and new Keys and Locks furnished at the shortest notice.

H. W. COVERT,
cor. Steuben and Water sts. Albany.
August 24, 1848.

NOTICE TO

Superintendents of Railroads.

TYLER'S PATENT SAFETY SWITCH.—The undersigned would respectfully call their attention to his Patent Safety Switch, which from long trial and late severe tests has proved itself perfectly reliable for the purpose for which it was intended. It is designed to prevent the train from running off when the switch is set to the wrong track by design or accident. The single rail or gate switch is established as the best and safest switch for the ordinary purpose of shifting cars from one track to another, but it is liable to the serious evil of having one track open or broken when connected with the other. My improvement entirely removes this evil, and while it accomplishes this important office, leaves the switch in its original simplicity and perfection of a plain unbroken rail, connecting one track with the other ready for use.

The following decision of the Commissioner of Patents is respectfully submitted to Railroad Engineers, Superintendents, and all others interested in the subject.

P. B. TYLER.

(COPY.)

UNITED STATES PATENT OFFICE,
Washington City, D.C., April 28th, 1846.

SIR: You are hereby informed that in the case of the interference between your claims and those of Gustavus A. Nicolls, for improvements in safety switches—upon which a hearing was appointed to take place on the 3d Monday in March, 1846, the question of priority of invention has been decided in your favor. Inclosed is a copy of the decision. The testimony in the case is now open to the inspection of those concerned.

Yours respectfully,
EDMUND BURKE,
Commissioner of Patents.

To Philos B. Tyler.

Any further information may be obtained by addressing P. B. TYLER, Springfield, Mass., or JOHN PENDLETON, Agent, 149 Hudson St., New York.
34tf

To the Proprietors of Rolling Mills and Iron Works.

THE Undersigned—Proprietors of Townsend's Furnace and Machine Shop, Albany—are extensively engaged in the manufacture of Machinery and fixtures for Iron, and Copper Rolling Mills, and Iron Works. Having paid particular attention to the manufacture of *Rolls* (Rollers), both *chilled* and *dry-sand*, they feel confident that they can execute orders for such castings in a satisfactory manner. And to give assurance of this, they beg leave to refer to the following named persons, proprietors and managers of some of the most extensive rolling mills in the country, viz: Jno. F. Winslow, J. Tuckerman, H. Burden, W. Burtt, J. & J. Rogers, Saltus & Co., J. B. Bailey, L. G. B. Cannon, Hawkins & Atwater, etc., etc.

FRANKLIN TOWNSEND & CO.
Albany, August 18, 1849,

Railroad Lanterns.

COPPER and Iron Lanterns for Railroad Engines, fitted with heavy silver plated Parabolic Reflectors of the most approved construction, and Solar Argand Lamps; manufactured by

HENRY N. HOOPER & CO.,
No. 24 Commercial St. Boston.
August, 16, 1849. 6m33

TO CONTRACTORS.

Extension of the Baltimore and Ohio Railroad.

Proposals are invited for the Graduation and Masonary of the part of this road not already under contract between Cumberland and the Tygart's Valley river—a distance of about 103 miles. The number of sections now to be let will be about 58; of which 23 occur between Cumberland and the mouth of Savage River—18 in the glades, and the remainder on Raccoon and Three Forks creeks. The work will generally be moderate, although there are a number of sections worth the attention of contractors accustomed to heavy jobs.

Specifications and plans will be ready at Cumberland, on and after the 27 of August current. The proposals, addressed to the undersigned, will be received at Cumberland up to Saturday the 15 of September inclusive. Further information may be had at the Company's Office in Cumberland. Full testimonials will be required from those unknown to the undersigned.

By oreer of the president and directors.

BENJ. H. LATROBE, Chief Engineer.
August 9, 1848.

Notice to Contractors.

OHIO AND PENNSYLVANIA RAILROAD.

PROPOSALS will be received at the office of the Ohio and Pennsylvania Railroad Company, in the town of Massillon, Stark county, Ohio, nntil sunset of Friday, the 28th of September, 1849, for the Grading and Masonry of the line between Canton and Wooster, a distance of about 32 miles. Proposals may be addressed to Wm. Robinson, Jr., President, or Solomon W. Robers, Chief Engineer of the company.

Drawings and specifications of the work to be let will be exhibited at the office in Massillon, for a week before the letting, by Jesse R. Strangham, the Resident Engineer of the Western Division.

By order of the Board of Directors.
WM. ROBINSON, Jr., President.
Pittsburg, August 11, 1849.

To Contractors.

SEALED PROPOSALS will be received until 12 o'clock, noon of Monday, the 3d day of September next, for grading, bridging and laying the superstructure of the road on all those sections embraced in the first division of the railroad, extending from Milwaukee to Waukesha 19 miles.

Plans and specifications can be seen at the office of the company, at any time after the 25th inst., between the hours of 9 a.m. and 5 p.m.

BYRON KILBOURN, President.
Milwaukee, August 6, 1849.

To Contractors.

BLUE Ridge railroad.—Proposals will be received by the undersigned at his Office in Brooksville, Albermarle county, Va., until the 1st of October next, for the construction of the tunnel through the Blue Ridge, together with the deep cut and embankment connected therewith at each end.

The tunnel will be 4,260 feet long, 16 feet wide and 20 feet high, with a ditch on each side: it will slope eastwardly at the rate of 66 ft. to the mile, and pass 700 feet below the top of the mountain.

Proposals will be received either for the whole or for one-half, it being distinctly stated, in this case, whether the Eastern or Western half is bid for.

Proposers are requested to examine the localities before bidding, and will obtain from the undersigned all necessary information.

The payments will be CASH, with a suitable reservation till the completion of the contract. The best testimonials and an energetic prosecution of the work will be expected,

Printed forms of proposals will be furnished on application to the undersigned.

By order of the President and Directors,
C. CROZET,
Engineer Blue Ridge Railroad.
Brooksville, July 26, 1849,

Journal of the Franklin Institute of the State of Pennsylvania, for the Promotion of the Mechanic Arts.

The oldest Mechanical Periodical extant in America, is published on the first of each month in the City of Philadelphia. It has been regularly issued for upwards of twenty-three years, and is carefully edited by a committee of scientific gentlemen appointed for the purpose, by the Franklin Institute.

The deservedly high reputation, both at home and abroad, which this Journal has acquired and sustained, has given it a circulation and exchange list of the best character, which enables the Committee on Publications to make the best selection from foreign Journals and to give circulation to orignal communications on mechanical and scientific subjects, and notices of new inventions; notices of all the Patents issued at the Patent Office, Washington City, are published in the Journal, together with a large amount of information on Mechanics, Chemistry, and Civil Engineering, derived from the latest and best authorities.

This Journal is published on the first of each month, each number containing at least seventy-two pages, and forms two volumees annually of about 432 pages each, illustrated with engravings on copper and on wood of those subjects which require them.

The subscription price is Five Dollars per annum, payable on the completion of the sixth number; and it will be forwarded free of postage when five dollars are remitted to the Actuary (postage paid) in advance for one year's subscription.

Communications and letters on business must be directed to "the Actuary of the Franklin Institute, Philadelphia, Pennsylvania," the postage paid.

WILLIAM HAMILTON,
Actuary, F. I.

Patents for Inventions.

THE Subscriber offers his services for the procuration of Patents in the UNITED STATES; in the CANADAS and other British Colonial possessions; in the SPANISH, FRENCH and other WEST INDIES.

ALSO IN EUROPE.

ENGLAND WITH COLONIES; SCOTLAND and IRELAND. FRANCE, BELGIUM HOLLAND, etc.

☞ The foreign patents are procured through special agents, established by, and solely responsible to this establishment. At this office may be obtained all documents required in patent business; *Deeds, Conveyances, Agreements, Assignments*, etc. Counsel given on questions involving points of law in Contested Cases, and written opinions, on the title claims, etc., where the validity of a Patent is questioned.

MECHANICAL ENGINEERING DEPARTMENT.

Drawings of all kinds furnished to parties who wish to prosecute their own patent business. Accurate working drawings for Pattern Makers or for making Contracts with Manufacturers; calculations and drawings made, for constructing difficult and complicated machines or parts of machines. Draughtsmen furnished to take Drawings of Mills, Mill Sites, and Machinery, in any part of the country.

Pamphlets, containing full information on the above subjects, furnished gratis.

JOSEPH P. PIRSSON, Civil Engineer,
Offic, No. 5 Wall St.

Steam Boiler Explosions.

THE Subscriber having been appointed sole Agent for Faber's Magnetic Water Gauge, is now ready to supply the trade, and also individuals with this celebrated instrument. Besides the greatest safety from explosion resulting from its use, it is a thorough check against careless stoking and feeding. In marine engines it will regulate the exact quantity required in the "blow off." Pamphlets containing full information, can be had free on application to the Agent,

JOSEPH P. PIRSSON,
Civil Engineer, 5 Wall st.

Engine and Car Works,

PORTLAND, MAINE.

THE PORTLAND COMPANY, Incorporated August 8th, 1846, with a capital of $250,000, have erected their extensive Works upon the deep water of Portland Harbor, and receive and transport, to and from their works direct, to and from vessels of any class.

They now manufacture to order, and deliver upon the Railroads running in each direction from the city, or on shipboard as wanted, Locomotive, Stationary, or Steam Boat Engines; Passenger, Mail, Freight, Earth and Hand Cars; Railway Frogs, Switches, Chairs and Castings; and every other description of Machinery.

HORACE FELTON,
Superintendent.

JAMES C. CHURCHILL,
General Agent and Clerk.

ENGINEERS.

Arrowsmith, A. T.,
Buckfield Branch Railroad, Buckfield, Me.

Bancks, C. W.,
Engineer's Office, Southern Railroad, Jackson, Miss.

Berrien, John M.,
Michigan Central Railroad, Marshall, Mich.

Clement, Wm. H.,
Little Miami Railroad, Cincinnati, Ohio.

Fisk, Charles B.,
Cumberland and Ohio Canal, Washington, D. C.

Felton, S. M.,
Fitchburgh Railroad, Boston, Mass.

Floyd-Jones, Charles,
South Oyster Bay, L. I.

Ford, James K.,
New York.

Gzowski, Mr.,
St. Lawrence & Atlantic Railroad, Montreal, Canada.

Gilbert, Wm. B.,
Rutland and Burlington Railroad, Rutland, Vt.

Grant, James H.,
Nashville and Chattanooga R. R., Nashville, Tenn.

Harry, P.,
Binghamton, New York.

Holcomb, F. P.
Southwestern Railroad, Macon, Ga.

Higgins, B.
Mansfield and Sandusky Railroad, Sandusky City, O.

Johnson, Edwin F.
New York and Boston Railroad, Middletown Ct.

Latrobe, B. H.,
Baltimore and Ohio Railroad, Baltimore, Md.

Miller, J. F.,
Worcester and Nashua Railroad, Worcester, Mass.

Morton, A. C.,
Atlantic and St. Lawrence Railroad, Portland, Me.

McRae, John,
South Carolina Railroad, Charleston, S. C.

Nott, Samuel,
Lawrence and Manchester Railroad, Boston,

Reynolds, L. O.,
Central Railroad, Savannah, Ga.

Roberts, Solomon W.,
Ohio and Pennsylvania Railroad, Pittsburgh, Pa.

Robinson, James P.,
Androscggin & Kennebec Railroad, Waterville, Me.

Schlatter, Charles L.,
Northern Railroad (Ogdensburg), Malone, N. Y.

Stark, George.,
Bost., Con. and Mont. R. R., Meredith Bridge, N. H.

Steele, J. Dutton,
Pottstown, Pa.

Trimble, Isaac R.,
Philad., Wil. & Baltimore Railroad, Wilmington, Del.

Tinkham, A. W.,
United States Fort, Bucksport, Me.

Thomson, J. Edgar.,
Pennsylvania (Central) Railroad, Philadelphia.

Whipple, S.,
Civil Engineer and Bridge Builder, Utica, N. Y.

Williams, E. P.,
Auburn and Schenectady Railroad, Auburn, N. Y.

Williams, Charles H.,
Milwaukie, Wisconsin.

BUSINESS CARDS.

Samuel Kimber & Co.,
COMMISSION MERCHANTS
WILLOW ST. WHARVES, PHILADELPHIA.

AGENTS for the sale of Charcoal and Anthracite Pig Iron, Hammered Railroad Car and Locomotive Axles, Force Pumps of the most approved construction for Railroad Water Stations and Hydraulic Rams, etc., etc.

July, 27, 1849.

Dudley B. Fuller & Co.,
IRON COMMISSION MERCHANTS,
No. 139 GREENWICH STREET,
NEW YORK.

Cruse & Burke,
Civil Engineers, Architects and Surveyors,
Office, New York State Institution of Civil Engineers,
STATE HALL, ALBANY., N. Y.

Drawings, specifications and surveys accurately executed. Pupils instructed theoretically and practically at a moderate premium.

May 26, 1849.

To Railroad & Navigation Cos.

MR. M. BUTT HEWSON, *Civil Engineer*, offers his services to Companies about to carry out the surveys or works of a line of Navigation or Railroad. He can give satisfactory references in New York City as to his professional qualifications; and will therefore merely refer here to the fact of his having been engaged for upwards of two years conducting important Public Works for the British Government.

Communications will find Mr. Hewson at the office of the Railroad Journal, 54 Wall Street, New York.

J. T. Hodge,
NO. 1 NEW STREET, NEW YORK.

James Laurie, *Civil Engineer,*
No. 23 RAILROAD EXCHANGE, BOSTON, MASS.

Railroad Routes explored and surveyed. Estimates, Plans and Specifications furnished for Dams, Bridges, Wharves, and all Engineering Structures.

October 14, 1848. 6m*

James Herron, *Civil Engineer,*
OF THE UNITED STATES NAVY YARD,
PENSACOLA, FLORIDA.,
PATENTEE OF THE
HERRON RAILWAY TRACK.

Models of this Track, on the most improved plans, may be seen at the Engineer's office of the New York and Erie Railroad.

To Railroad Companies.

—WROUGHT IRON WHEELS—
SAFETY AND ECONOMY.
NORRIS' LOCOMOTIVE WORKS,
SCHENECTADY, NEW YORK,

Are Manufacturing Wrought Iron Driving, Truck, Tender, and Car Wheels—made from the best American Iron. Address E. S. NORRIS.

May 16, 1849.

Manning & Lee,
GENERAL COMMISSION MERCHANTS,
NO. 51 EXCHANGE PLACE,
BALTIMORE.

Agents for Avalon Railroad Iron and Nail Works. Maryland Mining Company's Cumberland Coal 'CED' —'Potomac' and other good brands of Pig Iron.

IRON.

Iron Store.

THE Subscribers, having the selling agency of the following named Rolling Mills, viz: Norristown, Rough and Ready, Kensington, Triadelphia, Pottsgrove and Thorndale, can supply Railroad Companies, Merchants and others, at the wholesale mill prices for bars of all sizes, sheets cut to order as large as 58 in. diameter; Railroad Iron, domestic and foreign; Locomotive tire welded to given size; Chairs and Spikes; Iron for shafting, locomotive and general machinery purposes; Cast, Shear, Blister and Spring Steel; Boiler rivets; Copper; Pig iron, etc., etc.

MORRIS, JONES & CO.,
Iron Merchants,
Schuylkill 7th and Market Sts., Philadelphia.

August 16, 1849. 1y33

THE NEW JERSEY IRON CO'S WORKS AT Boonton, are now in full operation, and can execute orders for Railroad Bars of any required pattern, equal in quality to any made in this country. Apply to

J. F. MACKIE,
Nos. 85 and 87 Broad St.

New York, June 8, 1849.

Railroad Iron.

OF approved T patterns, weighing 56 to 60 lbs. pe lineal yard, made by the best English manufacturers, and under our own specification and inspection. In store and to arrive. For sale by

DAVIS, BROOKS, & CO.,
68 Broad street.

New York, June 1, 1849. t

☞ The above will favorably compare with any other rails.

Railroad Iron, Pig Iron, &c.

600 Tons of T Rail 60 lbs. per yard.
25 Tons of 2½ by ½ Flat Bars.
25 Tons of 2½ by 9-16 Flat Bars.
100 Tons No. 1 Gartsherrie.
100 Tons Welsh Forge Pigs.

For Sale by A. & G. RALSTON & CO.
No. 4 So. Front St., *Philadelphia.*

Monument Foundry.

A. & W. DENMEAD & SON,
Corner of North and Monument Sts.,—Baltimore,
HAVING THEIR
IRON FOUNDRY AND MACHINE SHOP
In complete operation, are prepared to execute faithfully and promptly, orders for
Locomotive or Stationary Steam Engines,
Woolen, Cotton, Flour, Rice, Sugar Grist, or Saw Mills,
Slide, Hand or Chuck Lathes,
Machinery for cutting all kinds of Gearing.
Hydraulic, Tobacco and other Presses,
Car and Locomotive patent Ring Wheels, warranted,
Bridge and Mill Castings of every description,
Gas and Water Pipes of all sizes, warranted,
Railroad Wheels with best faggotted axle, furnished and fitted up for use, complete

☞Being provided with Heavy Lathes for Boring and Turning Screws, Cylinders, etc., we can furnish them of any pitch, length or pattern.

☞ Old Machinery Renewed or Sepaired—and Estimates for Work in any part of the United States furnished at short notice.
June 8, 1849.

Railroad Iron.

THE TRENTON IRON COMPANY ARE NOW turning out one thousand tons of rails per month, at their works at Trenton, N. J. They are prepared to enter into contract to furnish rails of any pattern, and of the very best quality, made exclusively from the famous Andover iron. The position of the works on the Delaware river, the Delaware and Raritan canal, and the Camden and Amboy railroad, enables them to ship rails at all seasons of the year. Apply to
COOPER & HEWITT, *Agents.*
17 Burling Slip, New York.
October 30. 1848.

American Cast Steel.

THE ADIRONDAC STEEL MANUFACTURING CO. is now producing, from American iron, at their works at Jersey City, N.J., Cast Steel of extraordinary quality, and is prepared to supply orders for the same at prices below that of the imported article of like quality. Consumers will find it to their interest to give this a trial. Orders for all sizes of hammered cast steel, directed as above, will meet with prompt attention.
May 28, 1849.

SPRING STEEL FOR LOCOMOTIVES TENDERS AND CARS.—The subscriber is engaged in manufacturing spring steel from 1¼ to 6 inches in width, and of any thickness required: large quantities are yearly furnished for railroad purposes, and wherever used its quality has been approved of. The establishment being large, can execute orders with great promptitude, at reasonable prices, and the quality warranted. Address J. F. WINSLOW, *Agent,*
Albany Iron and Nail Works.

Pig and Bloom Iron.

THE Subscribers are Agents for the sale of numerous brands of Charcoal and Anthracite Pig Iron, suitable for Machinery, Railroad Wheels, Chains, Hollowware, etc. Also several brands of the best Puddling Iron, Juniata Blooms suitable for Wire, Boiler Plate, Axe Iron, Shovels, etc. The attention of those engaged in the manufacture of Iron is solicited by
A. WRIGHT & NEPHEW,
Vine Street Wharf, Philadelphia.

Railroad Iron.

RAILROAD IRON & LOCOMOTIVE TIRES imported to order, and constantly on hand, by
A. & G. RALSTON,
4 South Front St., Philadelphia.

Railroad Iron.

THE MOUNT SAVAGE IRON WORKS, Alleghany county, Maryland, having recently passed into the hands of new proprietors, are now prepared, with increased facilities, to execute orders for any of the various patterns of Railroad Iron. Communications addressed to either of the subscribers will have prompt attention. J. F. WINSLOW, *President*
Troy, N.Y.
ERASTUS CORNING, Albany.
WARREN DELANO, Jr., N.Y.
JOHN M. FORBES, Boston.
ENOCH PRATT, Baltimore, Md.
November 6, 1849.

WILLIAM JESSOP & SONS'
CELEBRATED CAST-STEEL.

The subscribers have on hand, and are constantly receiving from their manufactory,
PARK WORKS, SHEFFIELD,
Double Refined Cast Steel—square, flat and octagon.
Best warranted Cast Steel—square, flat and octagon.
Best double and single Shear Steel—warranted.
Machinery Steel—round.
Best and 2d gy. Sheet Steel—for saws and other purposes.
German Steel—flat and square, "W. I. & S." "Eagle" and "Goat" stamps.
Genuine "Sykes," L Blister Steel.
Best English Blister Steel, etc., etc., etc.
All of which are offered for sale on the most favorable terms by WM. JESSOP & SONS,
91 John street, New York.
Also by their Agents—
Curtus & Hand, 47 Commerce street, Philadelphia.
Alex'r Fullerton & Co., 119 Milk street, Boston.
Stickney & Beatty, South Charles street, Baltimore.
May 6, 1848.

Railroad Iron.

100 Tons 2½ x ½, | 30 Tons Railroad.
All fit to re-lay. For sale cheap by
PETTEE & MANN,
228 South St., New York.
May 16, 1849.

MANUFACTURE OF PATENT WIRE ROPE and Cables for Inclined Planes, Standing Ship Rigging, Mines, Cranes, Tillers, etc, by
JOHN A. ROEBLING, *Civil Engineer,*
Pittsburgh, Pa.
These *Ropes* are now in successful operation on the planes of the Portage railroad in Pennsylvania, on the Public Slips, on Ferries, and in Mines. The first rope put upon Plane No. 3, Portage railroad, has now run four seasons, and is still in good condition.

Iron.

THE Works of the New Jersey Iron Company at Boonton, N. J., having been recently enlarged and put in good repair, the company are prepared to receive orders for Iron, which will be executed with dispatch; and they warrant their iron equal in quality and finish to any in this country.
½ Round and square, to 6 inches,
½ Flat 4 "
Ovals, half-ovals and half-round.
Hoop, band and scroll iron.
Nail plates, superior charcoal Horse shoe,
Iron, sheet and Boiler iron,
Tire iron for locomotives,
Railroad spikes.
Pig iron of superior quality for chilling.
do, for foundry purposes.
For sale by JOHN F. MACKIE,
85 & 87 Broad Street,
Sole agent for the New Jersey Iron Co,
June 9, 1849.

Railroad Iron.

THE UNDERSIGNED ARE PREPARED TO contract for the delivery of English Railroad Iron of favorite brands, during the Spring. They also receive orders for the importation of Pig, Bar, Sheet, etc. Iron. THOMAS B. SANDS & CO.,
22 South William street,
February 3, 1849. New York.

Railroad Iron.

THE SUBSCRIBERS ARE PREPARED TO take orders for Railroad Iron to be made at their Phœnix Iron Works, situated on the Schuylkill River, near this city, and at their Safe Harbor Iron Works, situated in Lancaster County, on the Susquehannah river; which two establishments are now turning out upwards of 1800 tons of finished rails per month.
Companies desirous of contracting will be promptly supplied with rails of any required pattern, and of the very best quality.
REEVES, BUCK & CO.,
45 North Water St., Philadelphia.
March 15, 1849.

Railroad Iron.

THE Undersigned offer for sale 3000 Tons Railroad Iron at a fixed price, to be made of any required ordinary section, and of approved stamp.
They are generally prepared to contract for the delivery of Railroad Iron, Pig, Bar and Sheet Iron—or to take orders for the same—all of favorite brands, and on the usual terms. ILLIUS & MAKIN.
41 Broad street.
March 29, 1849. 3m. 13

American Pig, Bloom and Boiler Iron.

HENRY THOMPSON & SON,
No 57 South Gay St., Baltimore, Md.,
Offer for sale, *Hot Blast* Charcoal *Pig Iron* made at the *Catoctin* (Maryland), and *Taylor* (Virginia), *Furnaces; Cold Blast* Charcoal Pig Iron from the *Cloverdale* and *Catawba*, Va., Furnaces, suitable for *Wheels* or *Machinery* requiring *extra* strength; also *Boiler* and *Flue Iron* from the mills of Edge & Hilles in Delaware, and *best quality Boiler Blooms* made from *Cold Blast Pig Iron* at the *Shenandoah Works*, Va. The productions of the above establishments can always be had at the lowest market prices for approved paper.
American Pig Iron of other brands, and *Rolled* and *Hammered Bar Iron* furnished at lowest prices. Agents for *Watson's Perth Amboy Fire Bricks*, and Rich & Cos. New York Salamander Iron Chests.
Baltimore, June 14, 1849. 6 mos

Iron Wire.

REFINED IRON WIRE OF ALL KINDS, Card, Reed, Cotton-flyer, Annealed, Broom, Buckle, and Spring Wire. Also all kinds of Round, Flat or Oval Wire, best adapted to various machine purposes, annealed and tempered, straightened and cut any length, manufactured and sold by
ICHABOD WASHBURN.
Worcester, Mass., May 25, 1849.

American and Foreign Iron.

FOR SALE,

300	Tons	A 1,	Iron Dale	Foundry Iron.
100	"	1,	" "	"
100	"	2,	" "	"
100	"	"	Forge	"
100	"	Wilkesbarre	"	"
100	"	"Roaring Run"	Foundry	Iron.
300	"	Fort	"	"
50	"	Catoctin	"	"
250	"	Chikiswalungo	"	"
50	"	"Columbia" "chilling" iron, a very superior article for car wheels.		
75	"	"Columbia" refined boiler blooms.		
30	"	1 x ⅛ Slit iron.		
50	"	Best Penna. boiler iron.		
50	"	"Puddled" "		
50	"	Bagnall & Sons refined bar iron.		
50	"	Common bar iron.		

Locomotive and other boiler iron furnished to order.
GOODHUE & CO.,
64 South street
New York.

PATENT HAMMERED RAILROAD, SHIP & BOAT SPIKES. — The Albany Iron Works have always on hand, of their own manufacture, a large assortment of Railroad, Ship and Boat Spikes from 2 to 12 inches in length, and of any form of head From the excellence of the material always used in their manufacture, and their very general use for rail roads and other purposes in this country, the manufacturers have no hesitation in warranting them fully equal to the best spikes in market, both as to quality and appearance. All orders addressed to the subscribers at the works will be promptly executed.
JOHN F. WINSLOW, *Agent.*
Albany Iron and Nail Works, Troy, N. Y.
The above Spikes may be had at factory prices, of Erastus Corning & Co Albany; Merritt & Co., New York; E. Pratt & Bro., Baltimore Md

LAP—WELDED
WROUGHT IRON TUBES
FOR
TUBULAR BOILERS,
FROM 1 1-2 TO 8 INCHES DIAMETER.

These are the ONLY Tubes of the same quality and manufacture as those so extensively used in England, Scotland, France and Germany, for Locomotive, Marine and other Steam Engine Boilers
THOMAS PROSSER,
Patentee.
28 Platt street, New York.

Roman Cement,

OF the best quality, now landing from ship Hendrick Hudson, from London, made by Billingsley, Mial & Co., and superior to anything of the kind manufactured in England. For sale by G. T. SNOW,
109 Water Street, New York.

Large Wooden Pumps.

SEVERAL Large Wooden Square Pumps, of various sizes from 6 to 24 inches, and lengths from 10 to 25 feet, strongly bolted and strapped together with wrought iron; and used to great advantage on the Boston Water works; also two screw pumps each 25 feet long and 2½ feet in diameter, are now for sale by the Boston Water Commissioners.

For further particulars inquire at No. 119 Washington Street, Boston, or of E. S. CHESBROUGH,
West Newton.

June 8, 1849.

P. S. DEVLAN & CO's Patent Lubricating Oil.

THE Subscribers invite the attention of Railroads, Steamboats, Machinists, etc., to the above article of Oil; they are prepared to supply it in any quantity. Certificates of its superiority over all other oils, from several of the largest Works and Railroads, can be seen at our office. KENNEDY & GELSTON,
5½ Pine street, New York,

Sole Agents for the New England States and State of New York. 1y14

TO RAILROAD COMPANIES AND MANUfacturers of Railroad Machinery. The subscribers have for sale American and English Bar Iron, of all sizes; English Blister, Cast, Shear and Spring Steel; Juniata Rods; Car Axles, made of double refined iron; Sheet and Boiler Iron, cut to pattern; Tires for Locomotive Engines, and other railroad carriage wheels, made from common and double refined B. O. Iron; the latter a very superior article. The Tires are made by Messrs. Baldwin and Whitney, Locomotive Engine Manufacturers of this city. Orders addressed to them, or to us, will be promptly executed.

When the exact diameter of the wheel is stated in the order, a fit to those wheels is guaranteed, saving to the purchaser the expense of turning them out inside.

THOMAS & EDMUND GEORGE,
a45 N. E. cor. 12th and Market sts., Philad., Pa.

To Railroad Companies and Contractors.

FOR SALE.—Two Locomotive Engines and Tenders, at present in use on the Beaver Meadow Railroad, being too light for their coal trains, but well calculated for either gravel or light passenger trains.

They weigh, in running order, about 8 tons each—having one pair of driving wheels 4 feet diameter, 4 truck wheels 30 inches diameter, with cylinders 10 in. diameter, and 18 inches stroke of piston. Tenders on 4 wheels. Address JAMES ROWLAND,
Prest. Beaver Meadow Railroad & Coal Co.,
Philadelphia.
or, L. CHAMBERLAIN, Sec'y,
at Beaver Meadow, Pa.

May 19, 1849. 20tf

India-rubber for Railroad Cos.

RUBBER SPRINGS—*Bearing and Buffer—Fuller's Patent—Hose* from 1 to 12 inches diameter. Suction Hose. *Steam Packing*—from 1-16 to 2 in. thick. *Rubber and Gutta Percha Bands.* These articles are all warranted to give satisfaction, made under Tyer & Helm's patent, issued January, 1849.—No lead used in the composition. Will stand much higher heat than that called "Goodyear's," and is in all respects better than any in use. Proprietors of railroads do not be overcharged by pretenders.

HORACE H. DAY,
Warehouse 23 Courtlandt street.

New York, May 21, 1849.

NICOLL'S PATENT SAFETY SWITCH FOR Railroad Turnouts. This invention for some time in successful operation on one of the principal railroads in the country, effectually prevents engines and their trains from running off the track at a switch, left wrong by accident or design. It acts independently of the main track rails; being laid down or removed without cutting or displacing them.

It is never touched by passing trains, except when in use, preventing their running off the track. It is simple in its construction and operation, requiring only two castings and two rails; the latter, even if much worn or used, not objectionable.

Working models of the Safety Switch may be seen at Messrs. Davenport, Bridges & Kirk's Cambridge Port, Mass., and at the office of the Railroad Journal, New York.

Plans, Specifications, and all information obtained, on application to the Subscriber, Inventor and Patentee. G. A. NICOLLS,
Reading, Pa.

Large Pumps.

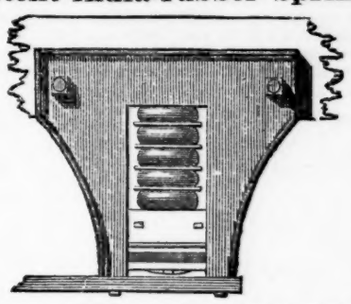
THE Boston Water Commissioners offer for sale a large number and variety of Wooden Square Pumps, used in clearing excavations from water during the construction of the Aqueducts.

Also Two Large Screw Pumps, each 25 feet long and 2½ feet in diameter.

For further particulars, enquire at the office of the Water Commissioners, 119 Washington St., Boston, or of E. S. Chesbrough, West Newton.

May 19, 1849. 6w20

Patent India-rubber Springs.



FULLER & CO. beg that parties interested in the use of these Springs will not be misled by ex-parte statements, but will examine the actual Patents and judge for themselves.

The statements made by Messrs. Crane & Ray shall be treated seriatim.

They claim to have first introduced India-rubber Springs about two years since, whereas they were used by Fuller & Co. nearly four yeas ago.

They claim the exclusive right to use Sprngs. They have no right whatever; every spring they make is an infringement upon Fuller's patent, dated 1845. They claim the sole right to make India rubber, and apparently think because a species of India-rubber was patented some years since, that no person can make any other now. A patent was *granted in January last* to Messrs. Tyer & Helm for a new and improved kind of Vulcanized rubber which is used by Fuller & Co.

Fuller's springs it is needless to say are in very general use, although Messrs. Crane & Ray pretend that they know of only one or two instances. Fuller & Co. guarantee all parties who use their springs.

As to the Legal proceedings—an action has been commenced against one company for an alleged infringement of Goodyear's patent, but is being defended with every prospect of success. An action has also been commenced by Fuller & Co., against parties for an infringement of Fuller's patent, and *this will be done in every case of violation.*

In every case in which Fuller's spring has been applied, it has been pronounced superior to that made by Mr. Ray, and this fact induces Messrs. Crane & Ray to claim the right of using it. They attempt to lead the public from the real question at issue, by producing a Deposition as to Mr. Ray having *tried to make* a spring which Mr. Fuller *did make* and patent. If Mr. Ray did invent a spring in 1844, why did he not apply for a patent, and not wait until 1848, when his application was rejected!

Mr. Knevitt has never stated that the springs were put on by him, which are refered to in Mr. Hale's article, but he does state that those springs are made according to Mr. Fuller's specification, and consequently are an infringement upon it. The article of Mr. Hale in the Boston Advertiser, quoted by Messrs Crane & Ray, was followed immediately by a letter in the same paper, from Mr. Knevitt, setting forth the facts of the case.

The springs refered to were put on by Mr. Ray before Mr. Knevitt came to the United States; when he arrived he gave Mr. Ray notice not to proceed further in making or vending such springs; Mr. Ray then said he did not wish to infringe, and would not continue to do so, and he then contrived an India-rubber and Air spring which totally failed.

In the selection of their first agent, Fuller & Co. were particularly unfortunate, and their reason for adverting to it is simply that it may tend to throw light on subsequent transactions, and furnish a reply to the remark, "that this opposition was invited by their own delay in getting the thing to work." The individual refered to undertook the agency for Fuller's springs, and left Liverpool on the 1st January, 1847, furnished with a complete set of drawings, models, etc., and every necessary instruction to make arrangements respecting the supply of material, and to have it at work within the time limited by law; but *from that hour to the present, not a single communication has been received from the said agent.* Some of their models, however, they have traced into the hands of parties now seeking to invade their rights, and by whom they understand they have been exhibited as specimens of their own invention.

The superiority of Fuller's spring is implied in the offer of the New England Car Co. to make springs upon his principle (now that a preference is given to the disc and plate form) and this notwithstanding the fact, that Fuller & Co. have a patent, and that Mr. Ray's application for one was rejected. The public can judge which company's course has been the most honorable, or whose statements are entitled to consideration.

Fuller's springs can be obtained of *Mr. Knevitt* the Agent, at 38 Broadway New York, and of *Messrs James Lee & Co.*, 18 India Wharf, Boston.

May 26, 1849.

C. W. Bentley & Co.,

IRON Founders, Portable Steam Engine Builders and Boiler Makers, Corner Front and Plowman Sts., near Balttmore St. Bridge,

BALTIMORE, MARYLAND.

Their Engines are simple in their construction, compact and durable; they require no brick work in setting them, and occupyidg but a small space (a six horse power engine and boiler, standing on a cast iron plate of three by six feet.)

They also manufacture Major W. P. Williamson's new oscillating Engine; a superior article, combining cheapness and simplicity (one of which may be seen in operation at their shop.) Both of these engines are adapted to any purpose where power is required, and may be made of any capacity; and for economy in use of fuel are unsurpassed.

All kinds of machinery made to order. Steam Generators, Force Pumps, Wrought Iron Pipes and Fillings for Steam, Water, Gas, etc., constantly on hand,

Baltimore, June 6, 1849.

PHILADELPHIA CAR MANUFACTORY,

CORNER SCHUYLKILL 2D AND HAMILTON STS.,

SPRING GARDEN, PHILADELPHIA CO., PA.

Kimball & Gorton,

Having recently constructed the above works, are prepared to construct at short notice all kinds of

RAILROAD CARS, Viz:

Passenger Cars of all classes—Open and Covered Freight and Express Cars—Coal Cars—Hand Cars & Trucks of all descriptions.

They are also prepared to furnish Chilled Wheels of any pattern. Car Wheels & Axles fitted and furnished. Snow Ploughs and Tenders made to order. Steel and other Springs always on hand.

All orders will be filled at short notice, and upon as good terms as at any other establishment in the country.

Omnibuses from the Exchange run within one square of the manufactory every 10 minutes during the day.

Philadelphia, June 16, 1849. 1y25

LAWRENCE'S ROSENDALE HYDRAULIC Cement. This Cement is warranted equal to any manufactured in this country, and has been pronounced superior to Francis' "Roman." Its value for Aqueducts, Locks, Bridges, Flooms, and all Masonry exposed to dampness, is well known, as it sets immediately under water, and increases in solidity for years.

For sale in lots to suit purchasers, in tight papered barrels, by JOHN W. LAWRENCE,
142 Front-street, New York.

☞ Orders for the above will be received and promptly attended to at this office. 32 1y.

Text Book of Mechanical Drawing,

FOR the use of SCHOOLS and SELF-INSTRUCTION, containing,

1st. A series of progressive practical problems in Geometry, with full explanations, couched in plain and simple terms; showing also the construction of the *parallel ruler, plane scales* and *protractor.*

2d. Examples for drawing *plans, sections* and *elevations* of Buildings and Machinery, the mode of drawing elevations from *circular* and *polygonal* plans, and the drawing of Roman and Grecian Mouldings.

3d. An introduction to *Isometrical drawing*, with 4 plates of examples.

4th. A treatise on *Linear Perspective*, with numerous examples and full explanations, rendering the study of the art easy and agreeable.

5th. Fxamples for the projection of shadows.

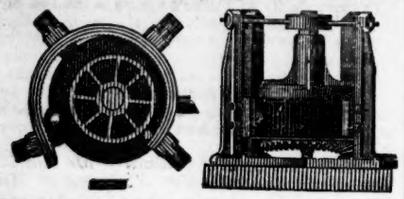
The whole illustrated with 50 STEEL PLATES.

Published by WM. MINIFIE & CO.,
114 Baltimore St., Baltimore, Md.

Price $3, to be had of all the principal booksellers.

MACHINERY.

Henry Burden's Patent Revolving Shingling Machine.



THE Subscriber having recently purchased the right of this machine for the United States, now offers to make transfers of the right to run said machine, or sell to those who may be desirous to purchase the right for one or more of the States.

This machine is now in successful operation in ten or twelve iron works in and about the vicinity of Pittsburgh, also at Phœnixville and Reading, Pa., Covington Iron Works, Md., Troy Rolling Mills, and Troy Iron and Nail Factory, Troy, N. Y., where it has give universal satisfaction.

Its advantages over the ordinary Forge Hammer are numerous: considerable saving in first cost; saving in power; the entire saving of shingler's, or hammerman's wages, as no attendance whatever is necessary, it being entirely self-acting; saving in time from the quantity of work done, as one machine is capable of working the iron from sixty puddling furnaces; saving of waste, as nothing but the scoria is thrown off, and that most effectually; saving of staffs, as none are used or required. The time required to furnish a bloom being only about six seconds, the scoria has no time to set, consequently is got rid of much easier than when allowed to congeal as under the hammer. The iron being discharged from the machine so hot, rolls better and is much easier on the rollers and machinery. The bars roll rounder, and are much better finished. The subscriber feels confident that persons who will examine for themselves the machinery in operation, will find it possesses more advantages than have been enumerated. For further particulars address the subscriber at Troy, N. Y. P. A. BURDEN.

Railroad Spikes and Wrought Iron Fastenings.

THE TROY IRON AND NAIL FACTORY, exclusive owner of all Henry Burden's Patented Machinery *for making Spikes*, have facilities for manufacturing large quantities upon short notice, and of a quality unsurpassed.

Wrought Iron Chairs, Clamps, Keys and Bolts for Railroad fastenings, also made to order. A full assortment of Ship and Boat Spikes always on hand.

All orders addressed to the Agent at the Factory will receive immediate attention.

P. A. BURDEN, *Agent*,
Troy Iron and Nail Factory, Troy, N. Y.

RAILROAD WHEELS.

CHILLED RAILROAD WHEELS.—THE UNdersigned are now prepared to manufacture their Improved Corrugated Car Wheels, or Wheels with any form of spokes or discs, by a new process which prevents all strain on the metal, such as is produced in all other chilled wheels, by the manner of casting and cooling. By this new method of manufacture, the hubs of all kinds of wheels may be made whole—that is, without dividing them into sections—thus rendering the expense of banding unnecessary; and the wheels subjected to this process will be much stronger than those of the same size and weight, when made in the ordinary way.

A. WHITNEY & SON,
Willow St., below 13th,
Philadelphia, Pa.

CHILLED RAILROAD WHEELS.—THE UNdersigned, the *Original Inventor* of the *Plate Wheel* with solid hub, is prepared to execute all orders for the same, promptly and faithfully, and solicits a share of the patronage for those kind of wheels which are now so much preferred, and which he originally produced after a large expenditure of time and money.

A. TIERS,
Point Pleasant Foundry.

He also offers to furnish Rolling Mill Castings, and other Mill Gearing, with promptness, having, he believes, the largest stock of such patterns to be found in the country. A. T.

Kensington, Philadelphia Co., }
March 12, 1848. }

ENGINE AND CAR WORKS.

DAVENPORT & BRIDGES,

HAVING ASSOCIATED WITH THEM

MR. LEWIS KIRK, OF READING, PA.,

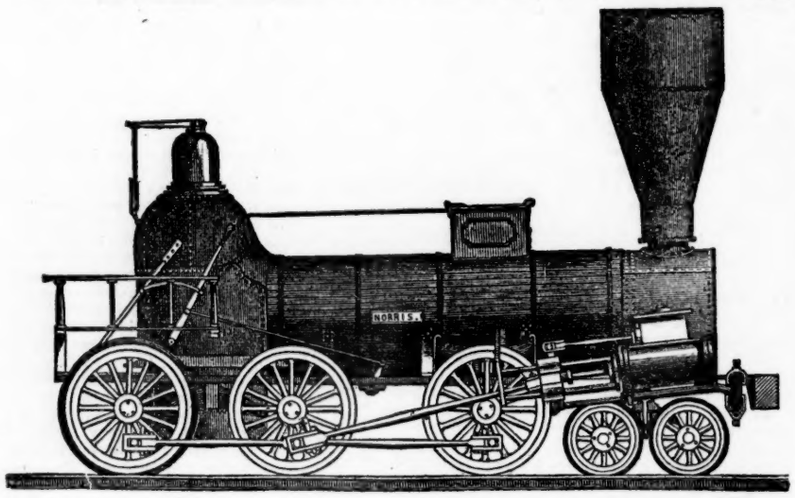
And recently enlarged their Establishment, (making it now the most extensive in the United States,) they are prepared to manufacture to order Locomotive Engines and Cars of every description. Stationary Engines, Steam Hammers, Boilers, and all kinds of Railroad Machinery. Also, Castings and Forge Irons of all kinds —including Chilled Wheels, Frogs, Chairs, Switches, Car Axles, and Locomotive Cranks, Connecting Rods, Steel Springs, Bolts, etc., etc. Orders from all parts of the country solicited for Engines and Cars, or any part or parts of the same. All orders will be furnished at short notice, and on as good terms as any manufactory in the country. Coaches pass our works every fifteen minutes during the day, from Brattle St., Boston.

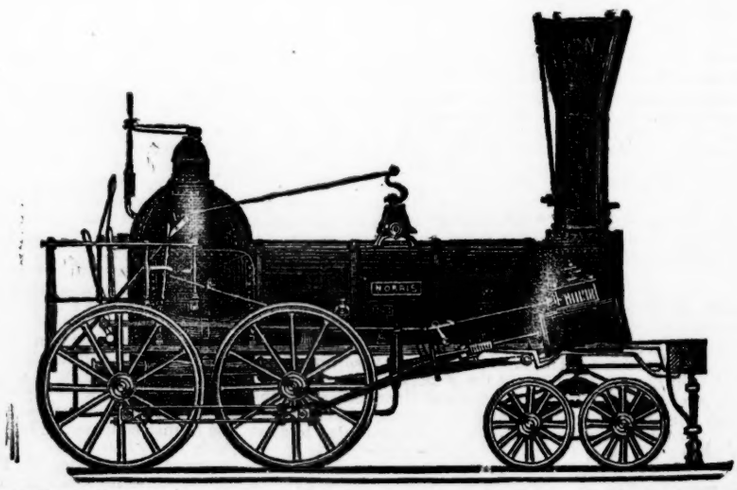
DAVENPORT, BRIDGES & KIRK.

Cambridgeport, Mass., February 16th, 1849.

NORRIS' LOCOMOTIVE WORKS.

BUSHHILL, SCHUYLKILL SIXTH-ST., PHILADELPHIA,





THE UNDERSIGNED Manufacture to order Locomotive Steam Engines of any plan or size.

Their shops being enlarged, and their arrangements considerably extended to facilitate the speedy execution of work in this branch, they can offer to Railway Companies unusual advantages for prompt delivery of Machinery of superior workmanship and finish.

Connected with the Locomotive business, they are also prepared to furnish, at short notice, Chilled Wheels for Cars of superior quality.

Wrought Iron Tyres made of any required size—the exact diameter of the Wheel Centre, being given, the Tires are made to fit on same without the necessity of turning out inside.

Iron and Brass castings, Axles, etc., fitted up complete with Trucks or otherwise.

NORRIS, BROTHERS.